

This remarkable story demolishes the myth that organic farming can never feed the world! Holistically adopted, it can also revitalise society, human health, and the environment. In the raging debate over rapid urban-industrial uprooting of farmers, here is one example the world cannot ignore.

After the Soviet Union collapsed – and the US tightened its embargo – Cuba's Organic Revolution began suddenly, under compulsion. A decade later, in 1999, the Swedish Parliament presented the Right Livelihood Award, or 'Alternative Nobel Prize', to GAO, Cuba's Organic Farming Association – for "showing that organic agriculture is a key to food security and environmental sustainability."

In 2006, the city of Havana alone grew 3 million tons of food –organically! The same year, the WWF and the Global Footprint Network declared: **Cuba is the only country on earth to achieve sustainable development!**

Not only has Cuba's food production greatly increased, its economy, health, energy efficiency and water security are all big gainers. The American Journal of Public Health reported a 45% decline in cardiovascular diseases. Cuba's bio-diverse agro-ecology and high forest cover also counter global warming.

*"Increasingly, people came to believe that productive, healthy harvests could be obtained on positive cost-benefit terms, while protecting the environment, ... without high energy use."*

Dr. Fernando Funes Aguilar, President, GAO

*"Cuba offers the first large-scale test of sustainable alternatives, ... before environmental realities (and the mounting fuel crisis) mandate the rest of the world embark on a sudden, wholesale switch to organic agriculture."* - Dr. Peter Rosset, 'Food First', Institute for Food & Development Policy, USA

*"... Cuba is creating something truly new and hopeful for all of humanity."* - Prof. Richard Levens, Harvard University School of Public Health



Rs 150

# ORGANIC REVOLUTION!

The Agricultural Transformation of Cuba since 1990



Bharat Mansata

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**Earthcare Books**

ORGANIC REVOLUTION!  
by Bharat Mansata

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**“I do not believe a plant will spring up  
where there is no seed. But I have faith in a seed.  
Convince me that you have a seed there, and  
I am prepared to expect wonders.”**

**HENRY DAVID THOREAU**  
**(19th century American nature writer)**

## PROLOGUE



### The Indian Context

*A* book on agro-ecological resurgence in Cuba—written in India? Sure, the two countries are on opposite faces of the earth. When it is day in one, it is night in the other.

Cuba is a sparsely inhabited island—an archipelago, to be precise—with 74% of her people concentrated in a few cities. India is a near sub-continent—populous, poly-cultural, predominantly rural. A land with a ten millennia history of farming, now in a steroidal rush to industrialise and urbanise! And of course, there are more differences...

Yet, the insistent 'sustainability' demands of our churning times suggest: there are valuable lessons India and the rest of the world can learn from that small Caribbean nation of Cuba.

When Cuba was extricating itself from a severe agricultural crisis, India was slipping deeper into one. In the past decade, at least a hundred and fifty thousand Indian farmers committed suicide; and that is just the officially acknowledged figure.

Who can deny that self-inflicted death is (usually) an act of extreme distress? While Indian farmers have experienced a spiralling of input costs and indebtedness, their yields and revenues have not just plateaued, but are declining in many places. Losses pile up on losses, year after year. It's a raw deal, to say the least.



Ecologically, the downslide has been precipitous. There is extensive degradation of the natural resources—of soil, ground water, vegetative cover, biodiversity—on which the sustainability of agriculture fundamentally depends. Systemic toxicity levels, pestilence and diseases have mounted.

The once seductive 'Green Revolution Technology' has plainly left farmers and farmlands writhing in India, as in many other parts of the world. From the small peasant or big landlord to the FAO, all can see it; though some yet prefer to call it 'technological fatigue'!

In its latest report, the National Commission on Farmers bemoaned that 40% of India's agricultural families would like to leave farming. That is the admitted level of frustration, or fatigue, among cultivators in sprawling swathes of the Indian countryside. It forebodes a potential quarter billion economic and ecological refugees streaming into India's slums and ghettos in quest of any available work to earn their daily bread.

Short of a miraculous re-orientation of national policy to socio-ecological health, and to local sovereignty and security in meeting primary needs—rather than economic expansion at any cost—the future could be grim. But though the Indian government urgently needs to morph its policy of promoting Special Economic Zones (SEZs) into a more holistic and humane approach of nurturing Socio-Ecological Zones, there is little indication of this presently happening.

On July 18, 2005, President Bush and Indian Prime Minister, Manmohan Singh, jointly announced a new Indo-US agreement, innocuously titled 'Knowledge Initiative on Agriculture' (KIA). Among other things, this sealed the acquiescent 'collaboration' of India's agriculture ministry with its American counterpart in transgenic agriculture. Monsanto, the undisputed corporate leader in genetically modified (GM) crops, secured a strategic formal place in the arrangement.

It is ironic that India, with vast experience in sustainable farming, and a rural population exceeding 70%, finds itself toeing the alien line of USA, which has less than *one percent* of its population occupied in agriculture—a highly energy-inefficient, industrial way of farming, precariously dependent on non-

renewable fossil fuels! That this one percent is propped with billions of dollars of government subsidy—each year—is glaring evidence of the economic bankruptcy of mainstream American agriculture.

In stark contrast, India has over 200 times as many people engaged in farming—the majority on small plots—who get by with little or no government support. Often, these small farmers actually subsidise the rest of the economy! In the US, two-thirds of the nation's massive farm subsidy goes to the top 10 percent of recipients with huge landholdings, comprising the largest farmers and agribusiness corporations that keep buying off the smaller farmers every year<sup>1</sup>—with state munificence!

Expanding aggressively across the planet, agribusiness giants like Monsanto make no secret of their resolve to wrench global control of the agricultural seed trade, and thereby, the power to hold the farmers of the world to ransom. Nearly half of the world's annual seed market of approximately 30 billion dollars is already in the hands of a few transnational corporations and their subsidiaries.<sup>2</sup>

Before the KIA was signed, India had set rolling its SEZ policy—favouring "fast corridor industrialization" with a generous basket of incentives. It was "unfortunate" if farmers had to lose their lands and livelihoods for setting up the Special Economic Zones! The Communist Party of India—Marxist (CPIM), which headed the Left Front government in the state of West Bengal, joined several protests against compulsory acquisitions of land for SEZs in various parts of the country. Within West Bengal though, the party's writ was different.

The Government of West Bengal notified its intent to compulsorily acquire a huge area of land in the fertile region of Nandigram—for setting up its own Special Economic Zone that would be the hub of a large chemical complex under an Indonesian multinational company. The local farmers refused to part with their land. They began a popular civil disobedience movement against any government steps in this direction.

Matters came to a head on the 14th of March, 2007, when the state government launched its 'Operation Nandigram', sending in a massive, armed police contingent. Much blood was shed. A

large number of unarmed local protesters, including women and children, died on the spot under the brutal assault. Official sources, however, claimed only 14 died, with many more severely injured.

'Operation Nandigram' shook up the people in the city of Kolkata, as in other parts of the state and nation, calling forth wide censure. While not overtly condoning the assault by State and Party, the Chief Minister of West Bengal insisted that measures to facilitate industrial growth were essential for economic progress, even at the cost of agriculture.

The Prime Minister of India concurred on the economic assessment, stating that agriculture had its limitations in spurring growth. In another context, the Agriculture Minister of the nation declared that India had "too many small farmers", and that such small-scale farming was not viable! The Union Minister of Finance endorsed a massive increase in urbanization with its concomitant shift in traditional occupations.

Nandigram was the specific trigger that set in motion the writing of the present book. The blithe devaluing of the agricultural livelihoods of small farmers by policy makers, cutting across party lines, sorely needed to be challenged with a fresh focus on an alternative agro-ecological approach. While the outstanding achievements of individual farmers like Bhaskar Save were being increasingly recognized, people also wanted examples of success on a larger scale.

Hence, this narrative on Cuba's remarkable agricultural transformation against formidable odds. With impending multiple crises—of food, fresh water, fuel, climate change, social unrest—simmering globally, this book may find wide relevance.

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## ONE



## Historical Background and Sudden Crisis

Landing on the isle of Cuba, half a millennium ago—in 1492—Christopher Columbus described it as "the most beautiful land human eyes have ever seen."<sup>1</sup> Much of it was then inhabited by the Arawak Indians, who practised a complex system of cultivation, known as *conuco* agriculture, combined with household gardens.<sup>2</sup> One of their most productive methods was the use of raised beds, called *camellones*, which were planted mounds of earth and organic matter.<sup>3</sup> This imparted excellent aeration in the soil, vital for healthy plant growth.

The common crops included maize (corn) and nutritious tubers like cassava, sweet potato, taro—the *vianda*—that formed the staple diet of the Arawaks,<sup>4</sup> who also grew tobacco and cotton.<sup>5</sup> Of course, all farming in that era was totally organic. The main input, aside from human labour, was the seed saved from the last harvest. The poly-culture of diverse foods provided more balanced and complete nutrition than modern monocropping. And the system was far more efficient in harnessing solar energy than the present day monocultures with their vastly reduced growth of biomass.

In subsequent centuries, the Cuban island became the headquarters for the Spanish crown in the Americas. The genocide of the local people by the Spaniards brought an end

to the Arawak system of farming and the rich native culture. With much of the indigenous workforce slaughtered, over half a million African slaves were shipped in. Cuban agriculture thus came to be strongly influenced by African traditions.<sup>6</sup>

The Spanish colonizers found it profitable to grow monocultures of sugar cane and tobacco for export to Europe. Such extensive cash-cropping is historically linked to the enslavement of Africans, brought to Cuba, Haiti and other Caribbean islands, Brazil or elsewhere. By the early 19th century, sugar production had established a dominant position in Cuba's economy, and large tracts of fertile land were planted with sugarcane.<sup>7</sup> Another major economic activity was cattle ranching.

In 1898, the United States interceded and claimed victory over Spain in 'Cuba's War of Independence'. Through the following three decades, US sugar giants bought up much of Cuba's land. The new mill owners began large-scale sugar cane production on their recently acquired property. For labour, they brought in sharecroppers and immigrant workers from Haiti and Jamaica, who toiled on very low wages. Though slavery in Cuba had been abolished in 1886—twenty-one years after it was outlawed in the United States—exploitative conditions continued. The new American mills offered progressively lower prices to the local farmers, who could not sustain production. Consequently, almost half of Cuba's *campesinos* lost their land in the first thirty years of the twentieth century.<sup>8</sup>

During these decades, the widespread planting of sugar cane also produced the most intense deforestation in Cuba's history. By around 1925, most of the extensive plains of Cuba had been planted with sugar cane. The largest ranches were predominantly sugar cane plantations and cattle rearing estates. These occupied 70% of all agricultural land.<sup>9</sup>

By the 1930s, Cuba was the largest sugar producer in the world, providing half of the sugar cane sold on the international market.<sup>10</sup> This little island held 'Favored Trade Nation' status with the United States, which purchased six million tons of Cuban sugar each year.<sup>11</sup> Many rural men worked as cane

cutters, which was extremely hard labor. The salaries were paltry, and the employment for only four months in the year. The entire Cuban economy—including wages and interest rates—hinged on the international price of sugar.<sup>12</sup>

An agricultural census in 1946 showed that 1.5 percent of all landowners in Cuba possessed 47 percent of its agricultural land. And just five US sugar companies owned or controlled over two million hectares (about 30% of total cultivable area) in this small nation with only 6.8 million hectares of agricultural land.<sup>13</sup> Twelve years later, before the Cuban Revolution, large corporations and US citizens together owned as much as 75 percent of Cuba's entire arable area!<sup>14</sup>

In 1959, the Batista regime—then ruling Cuba—was overthrown and replaced by a new government. Its first step, within three months of seizing power, was the adoption of the 'Agrarian Reform Law' in May of 1959. This put limits on landholdings and redistributed land to squatters, sharecroppers, and landless farmers. Together with a second agrarian reform in 1963, more than 200,000 peasant families were settled on smaller, redistributed plots, while 70 percent of the *latifundio* (large sugar estate, cattle ranch) lands were converted into state farms.<sup>15</sup>

Predictably, the US saw red. It refused to purchase from Cuba the remaining 700,000 tons of the year's sugar quota, and all future sugar contracts were cancelled. The first of increasingly severe US sanctions against Cuba was imposed on July 6, 1960.<sup>16</sup> The obvious intent of the powerful 'Goliath' was to crush this audacious little nation with "the most far-reaching trade embargo in history".<sup>17</sup> But it merely pushed Cuba firmly onto the Soviet lap. Castro's only option was to forge strong links with this other giant bloc—to survive.

The Soviet Union agreed to buy all of Cuba's sugar harvest at a higher price, and with five-year contracts—in place of the annual contracts with the U.S. Thus began a trade relationship that would last for the next three decades, and eventually, almost all of Cuba's trade would be with Soviet Bloc countries. With the generous trading terms provided by the Council of Mutual



Economic Assistance (CMEA or COMECON)—the international socialist marketplace—Cuba was able to sell its sugar at five times the world price; and in return, buy cheap petroleum, agrochemicals, and essential foodstuffs.<sup>18</sup>

While the Cuban revolutionary government had declared agricultural diversification a high priority, the sugar cane monocultures prevailed in the face of the US embargo, a growing foreign exchange deficit, and the resulting dependence on the Soviet Union. Farm diversification was relegated to being a medium or long-term goal.

Cuba began importing agricultural inputs from the Soviet Bloc, developing a highly mechanized and chemical-intensive agricultural sector. By the 1980s, Cuba had 21 tractors per 1,000 hectares, the highest ratio in Latin America. In the final years of the 1980s, Cuba imported more than 1,300,000 tons of chemical fertilizers, 17,000 tons of herbicides, and 10,000 tons of pesticides.<sup>19</sup> Almost all machinery, agrochemicals, fuel, and spare parts were imported, mainly from the Soviet Bloc.

As the number of tractors employed in Cuban agriculture grew to 90,000, the number of oxen teams for working the land shrank to less than 100,000.<sup>20</sup> To produce more milk, approximately 20,000 exotic dairy cows and 'high-quality bulls' were imported to "improve dairy herds". Trade schools for artificial insemination were established.<sup>21</sup>

As for the food people ate, 57% percent of the calories consumed by the Cubans in the late 1980s were still imported, including a full 80 percent of proteins and fats.<sup>22</sup> On the revenue side, sugar and its derivatives generated, on average, 75 percent of Cuba's export earnings.<sup>23</sup> Indeed, Cuba traded sugar for almost everything else!

Cuban agriculture in the 1980s—based on large-scale, capital-intensive monoculture—was more similar in many ways to the Central Valley of California than to the typical Latin American small farm. The country had the most industrialized, chemical-intensive agricultural sector in Latin America. But more than 90 percent of fertilizers and pesticides, or the raw materials to

make them, were imported from abroad,<sup>24</sup> while three of Cuba's principal export crops—sugar, tobacco and citrus—covered 50% of all agricultural land.<sup>25</sup>

Until the Soviet Bloc remained a dependable source of petroleum, chemical inputs, and grains—and a ready export market for Cuban sugar—the small island nation enjoyed a fair measure of economic prosperity. By 1989, it ranked 11th in the world in the Overseas Development Council's Physical Quality of Life Index (which includes infant mortality, literacy and life expectancy), while the US ranked 15th.<sup>26</sup> With only 2 percent of Latin America's population, Cuba boasted 11 percent of its scientists.<sup>27</sup>

Of course, numerous problems were already brewing, since industrial, chemical intensive agriculture rapidly degrades the basis for continued productivity through the erosion, compaction and salinization of soils, increase of crop diseases, and the development of pesticide resistance among insect pests. Crop yields decline, water tables fall, and aquifers and estuaries become contaminated with agrochemical run-off.<sup>28</sup> All these problems were increasingly evident in Cuba through the 1970s and 1980s. Further, the country had taken up an ambitious dam construction program—to supply the high irrigation required by sugar cane monocultures. Combined with the increased extraction of groundwater, this resulted in salt-water intrusion into freshwater aquifers near coastal areas.<sup>29</sup>

Cuba's National Commission for the Protection of the Environment and the Rational Use of Natural Resources (COMARNA) estimated in its report of 1991 that 7,711,500 hectares, or 70% of a total land area of 11,016,400 hectares, were affected by some degree of erosion, while 10% of Cuba's surface area was affected by salinization. Additionally, soil compaction—aggravated by the use of tractors and heavy farm machinery—had affected 1.6 million hectares, or almost 25% of agricultural land.

Dr. Fernando Funes Aguilar, one of the pioneering founders of the Grupo Agricultura Organico (GAO), or the Organic

Agriculture Association of Cuba, observes that the modern agricultural model resulted in serious economic, social and ecological problems:

“Over-specialization, monocropping, and excessive intensification; excessive dependence on external inputs (fertilizers, pesticides, animal feed concentrates, farm machinery, and irrigation equipment); large-scale deforestation; salinization, erosion, compaction, and fertility loss of soils; unsustainable factory-farming systems of cattle, poultry, and pig rearing; and heavy rural-urban migration.”<sup>30</sup>

Increased mechanization of farm activity spurred rapid population transfer from farms to the city, as much less rural employment was available for most of the year, barring the harvesting season. The three decades following the revolution in Cuba—when it intensified its industrial system of agriculture—thus witnessed a massive exodus from the countryside.<sup>31</sup> While in 1956, 56 percent of the population was rural, by 1989 that had dropped to 28 percent.<sup>32</sup> In barely 30 years, Cuba’s rural population had halved, significantly increasing the pressure on cities! Economically too, the nation’s export-oriented agriculture, dependent on international markets, heightened its vulnerability to external forces.

Conscious of the numerous, mounting problems associated with its reliance on the chemical-intensive cash-cropping of sugar cane, the earliest stirrings of an ‘alternative agriculture’ movement began in Cuba as early as 1982. In the following period, small farmers from across the country formed the National Association of Small Farmers (ANAP). Many joined Agricultural Production Cooperatives (CPA), or Credit and Service Cooperatives (CCS). Dr Fernando Funes Sr. writes that it was such small farmers who maintained crop diversity and integrated farming practices on their lands. “Valuable farming traditions survived as they continued to use animal traction and

intuitively practised agro-ecological science, which kept the management and economics of their farms on a sustainable basis, using very few or no external inputs.”<sup>33</sup>

Cuba initiated a ‘National Food Program’ in the late 1980s. One of its first aims was to convert 20,100 hectares of land—mostly around Havana City, where food needs were largest—from sugar cane production to vegetable farming. It was decided that self-provisioning areas, called *autoconsumos*, would be promoted at schools and workplaces, with the goal of increasing local self-reliance in food.<sup>34</sup>

In the meetings that led up to the announcement of the National Food Program, the modernist model of agriculture—and especially the high level of specialization and compartmentalization of agricultural institutions—was severely criticized. The delegates of *Poder Popular* (literally, ‘Peoples Power,’ the governmental body of Cuba) pushed for decentralization. Locally produced organic fertilizers and biological controls were also initiated. Such early measures were the precursors to the ‘new agricultural model’ that would later unfold in the years of crisis.<sup>35</sup>

#### CRISIS—THE TURNING POINT

Before the ‘National Food Program’ could achieve any significant results, Cuba’s economy was faced with the worst crisis in its history. In 1989, the Soviet system began to unravel. The same year, Cuba’s favourable terms of trade with the socialist Council of Mutual Economic Assistance (CMEA), were abruptly terminated. Soon, the Berlin Wall collapsed; and the Soviet Union and CMEA totally disintegrated. This meant the loss of almost all of Cuba’s import sources and export markets, devastating its economy.<sup>36</sup>

The Soviet Bloc had supplied 98 percent of Cuba’s petroleum. In 1988, 12-13 million tons were imported. But in 1991, only 6 million tons were received. Of Cuba’s total international trade, a full 85 percent was with the Soviets. Cuba exported to them

66 percent of its sugar and 98 percent of its citrus fruit. As for imports, aside from oil, 66 percent of the country's food, 86 percent of all raw material, and 80 percent of machinery and spare parts came from Soviet dominated trading partners.<sup>37</sup>

Consequently, when the external socialist support was withdrawn, factory closures became common, and much of the petroleum driven transportation came to a standstill. Tractors were grounded—for lack of both fuel and essential spare parts. Agrochemicals were just not available; and food scarcity became widespread.



Unused tractors gather rust in Cuba  
Photograph : Eduardo Martino

Dr. Fernando Funes Aguilar states, "Suddenly \$8 billion a year disappeared from Cuban trade. Imports were reduced by 75 percent, including most foodstuffs, spare parts, agrochemicals, and industrial equipment." As revenue from sugar exports fell from \$5,399.9 million in 1989 to \$1,156.7 million in 1993, imports had to be massively curtailed from \$8,139.8 million in 1989 to \$2,008.2 million in 1993.<sup>38</sup>

The Cuban government headed by Castro declared the 'Special Period in Peacetime'. Drastic measures, normally resorted to during war, had to be taken. These included: planned

blackouts, the use of bicycles for mass transportation, and the use of animals in the place of tractors—to mitigate the effects of the crisis and help the island survive the severe shortages.<sup>39</sup>

Food imports had supplied over half of the calories consumed in Cuba. Extensive food rationing was thus instituted to ensure equitable distribution in the difficult years. Where 19 items were rationed in the 1980s, by the early 1990s, virtually all food items became scarce enough to warrant controlled distribution. Overall caloric consumption dropped. The intake of fats and lipids fell even more dramatically. The sudden, sharp decline in nourishment was accompanied by a rise in energy consuming activities such as walking and cycling. Along with other factors, this led to several health problems, the worst of which was an eye disorder causing temporary blindness.<sup>40</sup> Epidemic neuropathy, caused by vitamin B deficiency, affected the vision of more than 50,000 people.<sup>41</sup>

With acute shortages of agricultural inputs such as fertilizers, pesticides, spare parts, and fuel to run irrigation pumps and harvest combines, domestic food production too plummeted. Other crucial services, such as food storage, refrigeration, and distribution—also dependent on petroleum—nearly ground to a halt. The food crisis was felt across the nation, and cities were the most affected, especially the capital city of Havana.<sup>42</sup> Dr. Fernando Funes Aguilar estimates that many Cubans lost between 15 and 30 pounds in the early years of this crisis. He himself shed about twenty-five pounds!<sup>43</sup>

In despair, many people cried, adds Dr Fernando. Some left the country. But others rose to the challenge, exercised their ingenuity, and toiled hard to overcome the unexpected disaster. Suddenly, an agricultural system, almost as modern and industrialized as that of California, was faced with a huge challenge: to double food production while more than halving inputs.

To make matters worse, the US enacted—in 1992—the punitive 'Cuba Democracy Act' (or Torricelli Bill), which tightened its existing trade embargo, and banned all foreign subsidiaries of US companies from trading with Cuba. It also

banned all sea vessels that had been to Cuba from docking in the US within six months, punishable by confiscation. Simultaneously, the US clamped several conditions on Russia and the newly independent states as they scrambled for US aid. One of these was to end all trade with Cuba.<sup>44</sup>

The Torricelli Bill was followed up in 1996 with the satirically-titled 'Cuba Liberty and Democratic Solidarity Act' (the 'Helms-Burton Act'), which barred the sale of even food or medicine to Cuba by any American or American-friendly industries. This Act also restricted foreign investment in Cuba. US Senator Jesse Helms, its prime mover, was remarkably honest about its aim—the replacement of Castro's government by one favoured by the US. "Let this be the year Cubans say farewell to Fidel," he declared, as the Act was passed in the Senate. "I don't care whether Fidel leaves vertically or horizontally; he's leaving."<sup>45</sup>

But rather than roll over and die, Cuba began to foment a new revolution, an organic one.

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TWO



## Transition: the Early Years of Re-organizing

In 1990, a survival economy was put in place. In the face of extremely serious shortages, growing more food was the primary challenge facing the nation. Castro announced that no piece of potentially cultivable land should be left unplanted. Since agrochemicals were extremely scarce, cultivators had no option but to use whatever biological inputs they could source locally. "Cuba turned organic by default!"<sup>1</sup>

The government began to decentralize food production and link it directly to consumers, minimizing transportation. Work places and institutions with any open spaces started growing their own food. For those lacking land, the local government helped provide cultivation rights to accessible plots. Farms began to deliver directly to ration stores, hospitals, and other consumption sites.<sup>2</sup>

Cuba thus embarked on "the largest conversion from conventional, industrial agriculture to organic and semi-organic farming that the world has yet seen."<sup>3</sup> While the initial thrust was on substituting agrochemicals with locally produced organic inputs, a broader agro-ecological approach began to gradually evolve. A whole new agricultural model—in some ways, as old as Nature herself—started taking shape.

Following decentralization, government policy allowed and

facilitated direct marketing at decontrolled prices based on demand and supply, which acted as a key incentive to increase food production. The people seized the opportunity and dug their hands into the soil. State institutions too jumped into the act. The Ministry of Agriculture (MINAG) tore up the front lawn at its modern headquarters in Havana, and planted lettuce, bananas, and beans. Employees, who normally worked behind desks, began watering and weeding to ensure a steady supply of food for their workplace lunchroom.<sup>4</sup>

The Minister of the Armed Forces affirmed: "Food production is our principal task."<sup>5</sup> The military would no longer take any food from civilian sources, but rather contribute, producing beyond its own needs. Instead of doing one year of mandatory military service, youth were given the option of working at one of the 93 farms across the country run by the EJT or 'Youth Work Troops'.<sup>6</sup>

The *autoconsumo* plan of 'self-provisioning' areas for local food production—initiated on a small scale in the late 1980s—was greatly expanded. Workplaces and institutions hosting their own cafeterias were made responsible for growing a portion of their food in any available open areas surrounding their facilities. *Autoconsumo* zones were thus started at state farms, sugar mills, and other workplaces in both rural and urban areas. This also helped reduce the need for transportation and refrigeration, saving on the use of scarce fossil fuels.

In September 1993, the Cuban government implemented a new bold and vitally needed agrarian reform. It broke up most of the large state farms to create smaller worker-owned collectives, called 'Basic Units of Cooperative Production' (UBPCs), which were autonomously managed by the local workers.

Prior to 1990, the State owned and managed 82 percent of the agricultural land in Cuba. These massive State enterprises were farmed in large mono-crop extensions, with a high level of agricultural inputs.<sup>7</sup> They were totally mechanised, but remained much less efficient than the other two sectors of Cuban agriculture: the private farms (mainly small holdings) with 8 percent of the land; and the Cooperatives for Agricultural



Production (CPAs)—commonly medium-sized farms—with 10 percent of the land.<sup>8</sup>

The small and medium farms that had continued to follow traditional, low input methods exhibited much higher resilience to the crisis. But until the 1993 agrarian reform, this sector represented only 12% of Cuba's total arable area. The large farms—managed through high-input, industrialized methods—dramatically collapsed.<sup>9</sup>

The 1993 reform immediately saw sixty percent of State farms broken up into private UBPC workers' collectives. While the State continued to own the land, the workers had free and indefinite use rights to cultivate it. Everything above the ground—buildings, machinery, and all other means of production—henceforth belonged to the workers as collective property. This policy change proved a critically important step towards more decentralized self-governance and self-financing of agriculture in Cuba.<sup>10</sup> It was prompted by the growing perception that smaller farms were more easily managed and better able to adopt sustainable agriculture practices.

While announcing the creation of the UBPCs (Basic Units of Cooperative Production) in 1993, the Ministry of Agriculture declared the following principles of functioning to motivate people to achieve higher production with the minimum possible use of material resources:

1. Connect workers to the land, increasing a feeling of direct responsibility;
2. Make the collectives of workers and their families self-sufficient in basic needs, and progressively improve housing conditions;
3. Enable workers to earn an income proportionate to their productivity;
4. Increase autonomy of governance, with each unit free to plan and administrate its own resources for self-sufficiency.

By late spring of 1994, all state owned sugar farms had been transformed into UBPCs with a combined membership of

1,33,685. In the non-sugar sector, 971 UBPC were formed by May 1995, reaching 1,576 in number by the end of 1997. By the spring of 1998, approximately 130,000 people had been incorporated into these non-sugar UBPCs, in addition to the 1,33,000 that had been collectivised upto 1994.<sup>11</sup> Multiplying these membership figures by the average family size of 4.5-5, over 1.2 million people were thus benefited upto 1998. By 2002, the total number of UBPCs had further increased to almost 3000.<sup>12</sup>

The older CPAs, or Agricultural Production Cooperatives, which first started in the sixties, began to rebound in the early 1990s. New members joined, drawn to farming by the advantages of rural cooperative life with respect to income, access to affordable food, and housing.<sup>13</sup> The CPAs served as models for the creation of UBPCs, since their post-1990 yields were much greater than those of the state farms. The main difference between the CPAs and the UBPCs was that the CPAs owned their land, while the UBPCs enjoyed free, indefinite use rights, with land ownership continuing to vest in the State.

Apart from the collective farms were the smaller farmers, assisted by their families, most of whom privately owned their lands. These *campesinos* organized themselves into Credit and Service Cooperatives (CCSs), which are associations of small farmers who join together to receive loans and extension services from state agencies. They may also share some machinery and equipment in common to take advantage of economies of scale for certain activities. By 2002, there were 168,000 members of CCSs cultivating 979,900 hectares.<sup>14</sup>

Because the small farmers produce more with less, the National Association of Small Producers (ANAP) began a program in 1998 to strengthen the business side of these co-operatives—helping them open bank accounts, hire administrators and marketing representatives, and to negotiate credit. In less than 3 years upto 2000, the membership of ANAP increased by 35,000.<sup>15</sup>

Consequently, the small farmers who tended their own land became the backbone of Cuba's agro-ecological movement,

They are the most productive sector in Cuban agriculture, outperforming both CPAs and UBPCs, and are also more prosperous than most other Cuban workers.<sup>16</sup> With only 20 percent of the total agricultural area, and less than 20 percent of the resources invested in agriculture, private farmers contributed 35 percent of the national production in 2002.<sup>17</sup>

One year after reorganizing worker relationships vis-à-vis the land and its produce, the Cuban government followed this up on October 1, 1994, with the opening up and diversification of marketing outlets. To begin with, 121 new farmers' markets were launched. All food growers were allowed to sell their produce directly to consumers after meeting any contractual obligations they had with state agencies. The absence of price controls or



Young vendors at a farmers' market

any state interference in setting price limits at these farmers' markets was a radical departure from earlier state policy. Prices set by supply and demand, enabled growers to earn higher prices, which stimulated increased production. Despite a ten percent sales tax, market sales provided very good incomes. In particular, many small farmers were able to triple or quadruple their net profits! In Havana and Santiago de Cuba, the two largest cities, only half the normal sales tax was charged, inducing growers to sell where the country's food needs were highest.<sup>18</sup>

Between 1991 and 1993, the average rate of inflation in the black market was calculated at 700 percent!<sup>19</sup> When farmers' markets opened, they immediately undermined the black market for many food items. One week earlier, rice—for example—was being sold in black for 50 pesos per pound. On the first day of the markets, rice opened at 12 pesos per pound, and the black market in rice immediately disappeared.<sup>20</sup>

Another rationale of opening the farmers' markets was that the transportation of perishables from the cultivators to the consumers could be accomplished more efficiently if undertaken on a smaller, localised scale. This proved valid and the new markets began to proliferate. By the spring of 1998, there were more than 300 such markets throughout the country; and approximately 65 in the city of Havana alone.<sup>21</sup> While commodity prices here are governed by demand and supply, the parallel State markets help to check excessive profiteering by setting their prices at 20% below the previous day's average farmers' market price.

As domestic production and supply of various foods increased, the prices in the farmers' markets began to drop. By January 1995, rice was sold from 7 to 10 pesos per pound, down from 12 pesos a year earlier. In 1997, small-scale rice production on individual plots reached 140,000 tons, nearing the total state/cooperative production of 150,000 tons.<sup>22</sup>

Aside from rice, many rural homes now grow their own staples, such as beans and the *vianda* root crops (cassava, taro, sweet potato) that are common in the traditional Cuban diet. Similarly, the cultivation of vegetables, plantains and other tropical fruit, together with herbal medicinal plants, has spread widely, as has the raising of small animals, especially in rural areas. Progressive farm diversification and self-reliance are recurrent themes, starting from the mid 1990s.

One of the most important strategies for increasing food security through localized production was to support the booming urban gardening movement. To do this, the Ministry of Agriculture made another unprecedented move and created the

world's first coordinated urban agriculture programme that integrated: access to land; extension services; research and development; new supply stores for small farmers; and organized points of sale for growers and new marketing schemes—all with a focus on urban needs. [See also Chapter 4, 'Urban Agriculture', and Appendix IV, 'Cultivating Havana'.]

The following year, the harvest was the highest-ever for 10 basic food items,<sup>23</sup> and productivity continued to grow. Before the end of the millennium, thirteen provinces of Cuba had broken their historical aggregate production records,<sup>24</sup> and nationwide sales of vegetables and fresh herbs reached an average of 469 grams per day per capita, well above the FAO recommended amount of 300 grams per day.<sup>25</sup>

In December 1999, the Swedish Parliament presented the Right Livelihood Award—or the 'Alternative Nobel Prize'—to the *Grupo de Agricultura Organica* (GAO), the Cuban organic farming association, which has been at the forefront of the country's transition to organic agriculture. Receiving the award, GAO's (then) President, Dr Fernando Funes-Aguilar, stated, "We hope that our efforts will demonstrate to other countries that conventional chemically-dependent agriculture is not the only way to feed a country."<sup>26</sup>

One more major agricultural reform in Cuba was yet to follow. In 2002, the government decided to close down about half of the sugar mills, and convert the land to food production and reforestation. The Cuban government offered sugar workers the choice of moving to new workplaces or going back to school to learn new skills. In either case, they were guaranteed that they would continue earning at least the same wages they had been receiving.

In the following years, more sugar mills were wound up, and by 2006, 110 out of Cuba's 155 sugar mills had been deactivated.<sup>27</sup> As a result, almost one million additional hectares of land became available for growing crops, and for reforestation.

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### THREE



## From Input Substitution to Agro-ecology

While for several decades, the fertility and organic life of Cuban soils steadily declined through the use of chemicals, their sudden non-availability from 1990 ushered in a greater use of locally generated 'bio-fertilizers' like compost and earthworm humus. By 1998, the national production of these two organic fertilizers had reached 700,000 tons.<sup>1</sup>

Five years later, in 2003, the supply of earthworm compost alone was one million tons, while the production of various other types of compost too had risen rapidly, jumping seven fold from 2001 to 2002, and reaching fifteen million tons in 2003.<sup>2</sup>

*Cachaza* 'filter cake'—a residual by-product of filtering cane juice by the sugar industry—was increasingly used in commercial crops, allowing a big reduction or total elimination of chemical fertilizer applications, especially with sugar cane, one of the most fertilizer-demanding crops.<sup>3</sup>

Cuban farmers diligently regenerated other fertility enhancing 'bio-agents', including naturally occurring strains of bacteria—such as rhizobium, azotobacter and azospirillum—which 'fix' atmospheric nitrogen in the soil, thereby replacing inorganic nitrogen. (The rhizobium perform this function symbiotically in association with the roots of leguminous plants,

while azotobacter and azospirillum are free-living nitrogen fixing bacteria.)

Surface vegetative biomass and the organic matter content of the soil rose significantly with the mulching of crop residues, the use of green manures, and the planting of locally suited leguminous cover crops, shrubs and trees.<sup>4</sup> This in turn supported growing populations of useful bacteria in the soil.

Further, the increased use of oxen to plough the land, as tractors lay idle in the absence of fuel and spare parts, enhanced the availability of dung manure. Collectively, all the above measures helped regenerate the organic life and fertility of farm soils.

#### BIOLOGICAL & BOTANICAL CONTROL OF PESTS

Nationwide, the use of chemical pesticides fell from 20,000 tons in 1989 to 1,000 tons in 2004, and continued to decline.<sup>5</sup> The many biological control methods that replaced them proved far more efficient and ecologically benign than the inorganic pesticides. Essentially, such biological control relies on natural predators that feed on crop pests, sometimes assisted by the native ingenuity of farmers.

For example, the use of cut banana stems, baited with honey (or molasses, jaggery or sugar) to attract ants—and then placed in sweet-potato fields—led to the complete control of the sweet-potato borer, a major pest, by the predatory ants! (Many species of ants are also voracious feeders of termites.)

The non-chemical strategies adopted to check crop damage include botanical and microbial pest-inhibitors that are harmless to humans.<sup>6</sup> A number of local plants are used as 'botanical pesticides'. Most of these actually inhibit reproduction rather than kill the insect pests. The pests are not wiped out, but any build-up of rampancy is effectively avoided or checked. Cuban researchers have confirmed that at least 40 species of plants from 25 families are significantly helpful in controlling a variety of pests.

Currently, the most widely used botanical species in pest control is Neem, or *Azadirachta indica*. Cuba now has over a million Neem trees, and uses Neem extracts, with its human-safe pest-control ingredient, azadirachtin, for both crop pest management and veterinary parasite control. Over 25 species of insect, mite, and nematode pests are being managed with Neem.

Four Neem processing plants, each with a capacity of 200 tons per year, are being (or have been) built. These mainly serve Cuba's booming urban agriculture and a rapidly growing export market.<sup>7</sup> In the most common method of present use, the Neem seeds are simply ground into powder and mixed at a rate of 25 grams of powder per liter of water, then applied at 300-600 liters per hectare. (The Neem seeds contain more of the active azadirachtin principle than other parts of the Neem plant, like the leaves.)

Among other important botanical species used are *Solanum mammosum* and marigold (*Tagetes patula*). While plantations and processing centers are also being developed for some of these botanicals, merely inter-cropping such species in food crop polycultures has been found effective in avoiding the build-up of pest populations.

#### LOCAL 'SYMBIO-TECHNOLOGY' & LABOUR SCARCITY

In the early nineties, faced with the challenge of increasing food yields in the shortest possible time frame with a limited rural workforce, Cubans chose to adopt simple, 'non-hazardous biotechnological measures' (as distinct from GM biotechnology) that symbiotically aided the fertility of the soil. They collected locally occurring strains of micro-organisms that perform useful functions in natural ecosystems. Some of these were nitrogen-fixing bacteria. Others aided natural processes of nutrient recycling in the soil. Yet others were 'antagonistic microbes' specific to certain crop pests, but harmless to other forms of life.

These microorganisms were then reproduced with local materials on a large scale (by the sons and daughters of *campesinos*) in many small, decentralized rural units—for use as bio-fertilizers and bio-pesticides.<sup>8</sup> Over the years, the National Plant Protection Institute of Cuba supported the creation of a national network of 276 'Centers for the Production of Entomophages and Entomopathogens' (CREEs), where local generation of bio-control agents is carried out.<sup>9</sup>

Dr. Peter Rosset, former Director of 'Food First' Institute for Food and Development Policy, USA, and one of the co-editors of 'Sustainable Agriculture and Resistance—Transforming Food Production in Cuba,' states: "Cuba is like the United States in that both countries face labour shortages in agriculture. Yet both are experiencing booms in organic farming, which is normally labour intensive.

"In 1990, eighty percent of the Cuban population lived in urban areas and only 20 percent was rural. (In the US then, over 95% of the population was urban, and less than 5% rural. The percentage of the American population occupied in farming has since fallen further, and is now less than one percent!) Cuba and the United States thus need more labour saving technology for organic farming than does a country like China (or India), where the vast majority of people live in the countryside.' Hence, the (initial) emphasis on biotechnology in Cuba," reasons Dr. Rosset.<sup>10</sup>

Dr. Rosset, of course, refers to the simple, time-tested and non-hazardous biotechnological methods described above. Cuba has wisely refrained from adopting genetically modified (GM) crops.

Many experienced farmers (and Dr. Rosset) recognize that the broader and superior agro-ecological approach—more labour-intensive in the initial years—would largely remove the need for the relatively narrow-focused biotechnologies and externally purchased bio-inputs. While a dynamically stable and healthy agro-ecological system may take several years to get established—depending on the severity of prior damage—the

system gradually becomes self-sustaining. The requirement of human labour progressively diminishes, particularly in the case of perennials and tree crops, which become increasingly independent as they mature. In the case of shorter duration field crops, replanted every season or every year, the labour inputs are less elastic.

#### REINSTATING TRADITIONAL PRACTICES & POLYCULTURES

In the early 1990s, it was observed that only the small farmers, following traditional methods, were able to sustain their yields. They were far more productive than those who depended on the scarce chemicals. Dr. Fernando Sr. recollects, "We thus began to revive the old traditions . . . of our parents, our grandparents. We started restoring everything our ancestors had taught us, those same ancestors who never used any chemicals."<sup>11</sup>

Cuban farmers across the island found themselves adopting practices like manuring, inter-cropping, crop rotation, fallowing, the use of oxen for ploughing, and the selection of traditional crops replanted from farmers' own seeds saved from the previous harvest.

Old, time-tested multiple cropping patterns, suited to local conditions, offer numerous synergistic benefits. For example, the legumes in the system provide nitrogen for the other crops to draw upon. The more rapid establishment of near complete vegetative cover on the land aids the regeneration of soil fertility, resists erosion, and creates favourable micro-climatic conditions for crop growth by buffering against strong wind and sun.<sup>12</sup>

Moisture loss—through evaporation or transpiration—declines. More humidity is retained in the system. Irrigation needs consequently drop, while the efficiency of both water usage and aquifer recharge rises, ensuring the ecological, regenerative utilisation of the local water supply.<sup>13</sup>

The root systems of diverse plants in mixed cropping draw their varied nutrient and micronutrient needs from different levels and regions of the soil. Combined with the spatial rotation



of the field crops (re-grown in different zones every planting season), the possibility of any nutrient deficiency arising in the soil greatly diminishes, especially with the recycling of all crop residues. The poly-cultures are also far more immune or resistant to the build-up of pest problems.

In Cuba, the most common crops grown in poly-culture include: cassava (tapioca), maize (corn), beans, sweet potato, taro, groundnuts, sesame, sorghum, squash, melon, tomatoes, cucumbers, soy beans; and green manures like vigna, mucuna, canavalia, etc. These integrated systems enable high land use rates and consequently enhance productivity, optimally utilizing the available natural resources, proving the vast potential of multiple cropping for intensive land use.<sup>14</sup>

The most common temporal patterns of crop rotation alternately grow non-legumes and legumes, and similarly augment total productivity from the land, while restoring nitrogen in the soil and aiding its fertility. Cuban farmers found, for example, that compared to the mono-cropping of sugar without rotation, the planting of soya bean (or another nitrogen-fixing edible legume) in rotation with sugar cane increased sugar cane yields by over 6 tonnes per hectare on an average, while fetching an additional harvest of over 1.5 tonnes per hectare of high protein bean or pulse legume.

#### OXEN

With the proliferation of tractors from the 1960s through the 1980s, the population of working oxen in Cuba had sharply dwindled from 400,000 pairs in the fifties to an insignificant number by 1989. But after the Soviet collapse and the tightening of the US embargo, the majority of tractors began rusting for want of fuel and spare parts; the farmers were forced to revert to the old practice of using oxen—both for ploughing and cartage.

A nationwide campaign was launched to stop the slaughter of cattle for food! The best animals were selected for breeding, and experienced traditional farmers across the island rose to

the need of the time. In 1997 alone, 2,344 'oxen events' took place, drawing 64,279 participant farmer-breeders! By 2002, there were again more than 300,000 oxen teams (pairs) at work in Cuba, reducing the fuel dependency of the nation.<sup>15</sup>

The traditional knowledge, skills and practice of oxen management were largely recovered, leading to more integrated land use and many agro-ecological benefits like dramatic reduction in soil compaction, greater availability of manure, and far more flexibility in working small, multi-cropped plots. Soils across the country began turning healthier, loamier.<sup>16</sup> Farmers also started selecting and breeding dual-purpose bovines—to both produce milk, and provide oxen work-teams for ploughing and carting.

#### AGRO-ECOLOGY: A HOLISTIC AND CULTURAL APPROACH

When Cuba's highly industrialized, chemical-intensive system of cultivation turned topsy-turvy in less than a year, her many agricultural scientists suddenly found themselves "riding piggy-back" on traditional farming experiences and practices. They had much to unlearn, and much to learn from old *campesinos*, before they could contribute anything significant in the radically changed scenario.



Two campesinos in the foreground of a suburban farm  
(Photograph : Lisa R. Wolfe)

Lest one errs in thinking that agro-ecology is a modern scientific discovery, Dr. Fernando Funes Aguilar hastens to acknowledge the immense debt that the current understanding of agro-ecology owes to its many precursors. He states, "While there are many research centers studying these topics, with important results, it has been the *campesinos* who never abandoned these practices, who have made the greatest contributions. . . . the many thousands of peasants and farmers (who) imparted their knowledge and experiences in forging Cuba's organic farming movement and its basic principles."<sup>17</sup>

Dr. Fernando Sr. goes on to name almost a dozen "great Cuban agricultural thinkers of the past, . . . the early pioneers, (who) wrote from a naturalist background, and established (or strengthened) the tradition of ecological agriculture, providing future generations with important concepts and ideas."<sup>18</sup>

Industrial agriculture scientists, despite their drawbacks—rooted in their institutional conditioning—could still recognize and acknowledge the many serious pitfalls of the methods they had promoted. Dr. Fernando (Sr.) observes: "There is now great concern around the world for the ecological problems resulting from the industrial agriculture model. These include: erosion, salinity, and infertility of a large part of our agricultural soils, the loss of biodiversity, growing deforestation, energy inefficiencies, and socio-economic problems in rural regions, including mass migration to cities."<sup>19</sup>

It has been estimated, for instance, that before the 'Special Period,' the modernised cattle ranches and dairy-farms of Cuba—with their 'White Udder' breeds descended from a line of Canadian Holsteins—consumed between ten to twenty units of energy for each unit of food energy produced!<sup>20</sup>

At a wider global level, it is reckoned that since the spread of chemical-intensive monocultures—as also deforestation under the urban-industrial onslaught—the earth lost more soil through erosion in the last few decades of the twentieth century than in all the rest of human history, thus irreversibly draining the 'core ecological capital' of farmers!

Apart from the massive and continually increasing erosion loss of fertile topsoil by heavy rain or strong wind, is the rapid degradation and deadening of the world's remaining agricultural soils through increased soil toxicity (induced by the chemicals), loss of innumerable micro and macro soil-dwelling life forms, collapse of soil structure and consequent compaction, mounting micro-nutrient deficiencies, soil salinisation, etc.—particularly in the tropics. "It's a dubious kind of 'profit' that earns a few dollars in exchange for a Dust Bowl!"<sup>21</sup>

A decade after being forced to abandon the industrial, chemical path for one using bio-inputs instead, Cuban agriculture still had its limitations, according to Dr. Fernando Sr. He remarks, "A narrow technical focus has not yet allowed us to take significant advantage of the synergies that would be possible in a more completely agro-ecological path. Nevertheless, this first phase (of input substitution) has been extremely important in meeting today's challenges. It has provided the basis for the widespread consolidation of organic farming on a large scale."<sup>22</sup>

Fernando Funes-Monzote, son of Dr. Fernando Funes Aguilar and Marta Monzote, writes: "The bio-input strategy now needs to evolve more widely into a holistic agro-ecological systems approach. Mere substitution of biological inputs for chemical ones, though demonstrably more sustainable than before, nevertheless has many of the same problems that occur in conventional systems. For example, the continuation of single crop monoculture." Fernando Jr. goes on to quote Prof. Miguel Altieri's observation that "mono-cultural patterns are the main cause of ecological disorders in conventional agriculture." He adds, "These problems will persist until there are broader changes in agro-ecosystem design."<sup>23</sup>

Elsewhere, Fernando Jr. states, "Only by more far-reaching transformation towards regenerative systems in place of those based on inputs—even if these are biological—will it be possible to enhance sustainability in the longer term. The integration of crops and livestock in a widely diversified 'mixed farming

system' (that includes trees and perennials) is one example based on agro-ecology, which allows for increasing food production while regenerating the environment."<sup>24</sup>

Marta Monzote and Fernando Jr. further observe: "Even more important is the high level of awareness and understanding of ecological agriculture developed in the people, together with organizational and human capacities for innovation and sharing of experiences. . . . The agro-ecological concepts stimulate the creativity and enthusiasm of farmers, leading to better decision making and performance."<sup>25</sup>

A visitor to Cuba, who spoke elementary Spanish, relates that she asked a farmer whether he liked his work. "*Este es trabajo bonito,*" came the prompt reply—this is beautiful work!<sup>26</sup>

Reporting on Cuba's Fifth National Conference on Organic Agriculture in 2003, Dr. Don Lotter states: One of the most talked about presentations among foreign delegates was that on an adjustable "multi-plow" for use by draught animals, relied upon by 80% of the small cultivators. Developed through the ingenuity of a Cuban farmer, this "multi-plow" can be used for ploughing, harrowing, ridging, and tilling, and can also be adapted for sowing, covering, hilling, and other operations.<sup>27</sup>

Dr. Fernando (Sr.) writes, "Organic farming and agro-ecology do not just represent a change of technological model, but of the very way we perceive agriculture . . . (Where earlier, the industrial, rapacious model dominated all thinking,) people gradually came to believe that productive harvests could be obtained on positive cost-benefit terms, while protecting the environment and nature; . . . without polluting soils, water and air; yet producing healthy foods without excessive energy use; and with reduced capital investment!"<sup>28</sup>

Many Cuban farmers see the future challenge as one of developing more complex, diverse, and integrated, land-community systems that take full advantage of synergies between their constituents. In this regard, they are able to draw on the promising results of those who have combined animals, crops, fruit, and timber trees on their farms, while also growing vegetables, medicinal plants, fodder, green manure, etc.

These mixed, agro-ecological farms commonly recycle all bio-residues to regenerate their soils, while adopting soil and water conservation to minimize resource losses. The use of animal traction is the norm rather than exception. Sometimes, wind energy too is harnessed. Such systems demonstrate that combining various farm components into a unified whole brings better results in terms of total production, economic profitability, energy efficiency, recycling of organic matter, and the optimal,



Dr. Fernando Funes Aguilar and Marta Monzote—dedicated campaigners for self-reliant ecological agriculture. Their two sons, Fernando Funes-Monzote, a researcher and writer on agro-ecology, and Reinaldo Funes-Monzote, an environmental historian, have followed in their steps. Fernando Jr. says of his "mother and tutor of my professional life," Marta, who died in 2007: "She was a dreamer, a passionate lover of life, and care taker of the family spirit, who always had trust in people and their capacity to overcome any situation. She was deeply convinced that another agriculture—for Cuba and the world—is possible and necessary for the sake of future generations . . . She now lives—in the daily memories of the many people she inspired—as a happy woman, ever ready to help without expecting anything in return."

sustainable use of natural resources.<sup>29</sup> Of course, the species and varieties of plants or animals introduced must be suited to the local conditions of soil, topography and climate.

In a report on several agro-ecological farms in Cuba, authored by Marta Monzote and Fernando Funes-Monzote, it is stated: "Diversification allowed for between 30 and 40 more products. The integrated systems vastly increased the energy efficiency, achieving a ten-fold unit output of energy produced per unit of energy input.<sup>30</sup> In stark contrast, the chemical-intensive, industrial mono-culture of cash-crops is highly energy inefficient, requiring significantly more energy input than what is produced!

"Labour intensity (in the agro-ecological farms) decreased yearly after a greater initial labour demand for establishing the system.<sup>31</sup> Over a six-year period of investigation, the human labour requirement on the mixed farms had declined by one-third.<sup>32</sup> Farm generated organic fertiliser (2 to 4 tonnes per hectare) was a major resource to meet the nutrient requirements of crops. Total productivity increased by up to 9.7 tonnes per hectare, including both crop and animal outputs."<sup>33</sup>

Dr. Fernando Sr. submits, "... the organic, agro-ecological approach makes complete sense. It enables a self-sufficient, socially just, and more *humane* society, without dependence on transnational corporations. It reduces the role of middlemen and intermediaries, develops the consciousness of farmers, and applies knowledge rather than crude technological recipes. It is an ally of nature and considers the farmer as a cultural (participant), and not just a productive unit."<sup>34</sup>

#### REFORESTATION AND NATURAL REGENERATION

Reforestation in Cuba is seen as essential to the evolution of integrated, sustainable systems. Since the early 1990s, over 100,000 hectares are being replanted every year, reversing a deforestation trend that plagued the country throughout its

modern history.<sup>35</sup> Live hedges, including species like bamboo, have been planted extensively. All this has helped check soil erosion and rain run-off, while enhancing sub-soil percolation and recharge of groundwater.

Continuing efforts have increased Cuba's forest cover from 14% in the early nineties to 24.3% by 2006.<sup>36</sup> Another more recent estimate (2007) puts the figure at over 25%. Part of the afforestation drive is the 'Designated Strategic Ecosystems Programme', which particularly targets regions and resources of vital importance to Cuba. One of its goals is to reforest major watersheds before the end of the current decade.<sup>37</sup>

Tree planting has also been taken up in a big way in and around farms, settlements and large urban areas. A major ecological initiative is the ongoing drive to plant two million trees in Havana alone over five years. This will include two hundred thousand fruit and nut trees.<sup>38</sup>

The ecological benefits of trees and forests are enormous and far-reaching in time and space. There is greatly increased harnessing of solar energy through increased photosynthesis and vegetative growth, correspondingly absorbing more carbon dioxide from the air to reduce global warming. Trees also attract rain-bearing clouds. Biomass availability and the microbial life in the soil are enhanced. Humus is thereby regenerated. Moisture absorption and percolation to aquifers rises, aided too by the passages created in the soil by plant roots and root fibres. Biodiversity multiplies, attracting birds, thus assisting in the biological control of potential crop pests, while bees, butterflies, etc. improve pollination, and consequently, the crop yields of neighbouring farms and horticultural gardens.<sup>39</sup>

An article in the National Geographic magazine of August 4, 2006, acknowledged that Cuba's environment is "largely pristine", due to the large tracts of land set aside for forest conservation and regeneration, and the numerous environment-related international treaties that Cuba has signed and abided by. Cuba's coastal areas and mangroves have earned the title of "crown jewel of Caribbean marine biodiversity". They are

an important refuge for hundreds of species of fish and marine animals, many of which have been wiped out elsewhere in the Caribbean.

#### SEEDS, CROP DIVERSITY AND PARTICIPATORY BREEDING

Participatory plant breeding is an approach involving farmers, where the trials and testing of crop varieties—for suitability to local conditions and needs—frequently takes place on farms, not under the controlled, unrepresentative conditions of institutional, experimental stations.

Humberto Ríos, a Cuban plant breeder, led a research project aimed at strengthening agricultural biodiversity in Cuba. This used seed fairs (among other methods) to help farmers share and breed different varieties of plant strains. Farmers attending such fairs selected varieties most suited to their environment and preferences. They took the seeds home, where they grew, multiplied, and continued to experiment with them.

The results exceeded expectations. Ríos observes, “In one community, for example, where they had merely four crop varieties, they are now growing over 100 varieties of beans, more than 100 varieties of rice, and more than 90 varieties of maize (corn). It’s impressive—unbelievable, really.”<sup>40</sup>



Seed multiplication on a campesino's farm

When Ríos was trying to determine what breeding traits were best, the farmers gave him a pragmatic lesson in selection that went against many things he had learned in classical plant breeding. His group of farmers liked plants with slightly diseased leaves and oddly shaped fruit. When Ríos asked why, they pointed out that the plants, although a little sickly, still produced a lot of deep-necked fruit. The flesh was bright coloured too, telling them that the vitamin content was better.

Only after he sat down to analyze the farmers' selection, did Ríos realize that they had chosen, among other traits, plants that produced large amounts of pollen as well—the better to pollinate other plants, thereby fetching yields enhanced in both quality and quantity. Knowing he was on to something, Ríos kept returning to the farmers to help him with the plant breeding field research he was doing.<sup>41</sup>

#### 'POPULAR RICE' AND THE MADAGASCAR METHOD

Like urban agriculture, the 'popular' production of rice (*arroz popular*) was originally a grassroots movement towards self-provisioning. People started to cultivate this cereal wherever they could, whether in abandoned areas or small plots between sugar cane fields. The movement grew rapidly and achieved unforeseen levels of production and efficiency. By 2001, these scattered plots of *arroz popular* were contributing more than 50% of total domestic rice production in Cuba, and the per capita consumption of this cereal reached 264 grams per day.<sup>42</sup>

Already in 1998, the national average yield of rice was 2.82 tons per hectare—without the use of costly inputs. This compared favorably to that of chemically cultivated rice during the 1980s.<sup>43</sup> Since then, a promising technological development has been the introduction of a new approach called the 'System of Rice Intensification' (SRI), also known as the Madagascar method of growing rice. This is promoted worldwide by, among others, the Cornell International Institute for Food, Agriculture and Development.

Within a few years, this system, which originated in Madagascar, has doubled rice yields in many farms of Cuba, as elsewhere in the third world, while reducing inputs like seed, water, etc.<sup>44</sup> While Cuba's total rice production was 172,000 tons in 1999, this rose to an estimated 300,000 tons in 2003. Optimistic experts are claiming that Cuba is potentially on its way to harvesting a significant surplus of rice, among other food crops.<sup>45</sup>

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FOUR



## Urban Agriculture

Before 1989, Havana had no urban agriculture to speak of. The city laws prohibited the cultivation of food crops in the front yards of city homes, where only ornamentals were permitted. Though residents could still grow food—out of sight—in their back yards, almost no one did so.

For thirty years since the Revolution, State distribution channels provided adequate quantities of staples like rice, beans and cooking oil to all citizens. The market offered many additional foods at marginally higher, yet very affordable prices. Though half of Cuba's total food needs were met by imports, there was no hunger, and even the poorest city-dwellers felt no pressing need to grow their own crops.

When the severe food crisis of the early 1990s shook the entire island, nowhere was the scarcity felt more deeply than in Havana, the largest city in the Caribbean, and home to 2.2 million people, roughly 20 percent of Cuba's population. Then—suddenly and spontaneously—urban food gardens began to spring up all over Havana, a massive popular response by the residents themselves.

In barely 5 years, there were over 28,000 *huertos* (Spanish for 'kitchen garden') in Havana city province alone, tended by

50,000-100,000 individuals;<sup>1</sup> and the urban gardening movement continued to grow in leaps and bounds.

Dr. Fernando Funes Aguilar recollects, "Every empty space was used for nothing but to grow food, as there was none. In 1992, urban agriculture in Cuba was almost zero. So, after beginning at zero, we were producing some hundred tons in 1993, some thousands in 1994, and some millions a decade later! In 2006, we produced 3 million tons of food within the city!"<sup>2</sup>

At first, the Cubans planted in and around their homes—on balconies, patios, and rooftops. Families with adjacent vacant lots began growing their food in them. Community organizations, such as the Cuban Women's Federation, and citizens' block committees, aided neighbourhood cultivation. Though enthusiasm ran high, most people had little knowledge of agriculture.

The overwhelming majority of Havana residents were first-time gardeners. Those with any farming experience had mainly worked in industrial agriculture—with mechanization, chemicals and field-scale plant spacing on large, mono-cropped extensions of land. Very few were familiar with the small-scale, highly diverse, poly-cultural organic techniques that were most needed for urban food gardening. But the people were determined. They planted any seeds they could find, using whatever tools were available, on any open land in sight.

Havana's city government and the Ministry of Agriculture responded to this upsurge of local initiative by providing land access and services, thus aiding the expansion of the popular city farming movement. In 1994, the world's first official and determinedly proactive Urban Agriculture Department was opened in Havana—with the goal of using *all* of the city's open land for food production. Now, each of the city's 15 municipalities has such a department, offering support, guidance and basic resources to urban gardeners—mainly local families and neighbourhood communities.

The first major task of the newly formed Urban Agriculture Department was to secure land use rights for city cultivators. It pushed for a change in Havana's laws to assure legal priority

for food gardeners to all unused space. It then set to work in earnest to provide them suitable plots.

Residents—desiring to set up a garden in their locality—solicited the local government, usually requesting a specific vacant plot. Land use rights were then distributed through the local municipality. The *Consejos Populares*—autonomous people's bodies, and the most localized level of self-governance—served as a bridge between the neighbourhoods and their municipal authorities. This decentralized strategy, cutting through red tape, greatly hastened land use allotments for food gardening.

Even privately owned, unused land was turned over to those who wished to cultivate it. The concerned local officials would first notify the legal owner of their intention to grant use rights to a local gardener (or a group of gardeners) for food production. If the owners objected, they were allowed six months to cultivate the land themselves, failing which the use rights stood transferred to the soliciting gardener/s.

With this legislative and administrative support, thousands of new gardens sprouted in Havana. The subsequent opening of many new marketing outlets—with deregulated prices—permitting direct sales to consumers, dramatically increased production incentives. Many urban farmers now earned two to three times as much as academically accomplished professionals! This provided a big fillip to the city's food-gardening movement, widely recognized as the crying need of the times. From 1994, urban agricultural production consistently doubled or tripled every year!<sup>3</sup>

In 1996, an ordinance was passed, prohibiting chemical pesticides for agricultural purposes anywhere within city limits. Havana's land use bylaws were amended. Henceforth, only organic methods of food production would be allowed. As a result, Havana's food gardens became the most organic sector of Cuban agriculture.

The Urban Agriculture Department, through its extension system, conducted numerous workshops and training sessions in organic gardening. Hundreds of neighborhood 'Horticultural Clubs', started by city farmers themselves, helped in the sharing

of information, ideas and experiences. Visits were organized to the small farms of traditional organic *campesinos*, from which the urban gardeners learned much.

'Seed Houses' opened up all over the city—to sell seeds, gardening tools, compost, bio-fertilizers, botanical (human-safe) pesticides and other bio-control agents at very reasonable rates. Their number rose from 3 in 1996 to 23 by early 2000.<sup>4</sup> Like the 'Horticultural Clubs', several of these Seed Houses also functioned as guidance and networking centres, enabling gardeners to interact among themselves, and to access the advice of specialists.

#### ORGANIZATIONAL CATEGORIES AND CULTIVATION STRATEGIES

Most of the food growing initiatives in Havana—and in other Cuban towns and cities—can be broadly grouped into five complementary, though somewhat overlapping, categories:

- *Huertos Populares* (popular kitchen gardens)—those cultivated privately by urban residents in small areas throughout Havana, primarily for self-provisioning.
- *Huertos Intensivos* (intensive gardens)—usually cultivated in raised beds, using a high ratio of compost to soil. The majority of these gardens are tended privately; others by a cooperative, collective or State institution.
- *Autoconsumos*—belonging to and run by the staff of specific workplaces and institutions, primarily to supply the cafeterias feeding their own workers. A number of the autoconsumos also sell substantial surplus at market prices.
- *Campesinos Particulares*—farms in the outlying greenbelt of the city, most of which are tended privately by individual farmers. A few are managed as workers' collectives or cooperatives.
- *Empresas Estatales*—state-owned city or suburban farms. These were drastically reorganized into smaller, semi-private working units, each run as a 'New Type of Enterprise,' with

decentralization, autonomy, and varying degrees of direct profit sharing with workers.

[See Appendix IV, 'Cultivating Havana' by Catherine Murphy, for a more detailed discussion of the above categories, as well as Cuban city farming in general.]

*Organoponicos*—another common term for certain initiatives—refers more to the agricultural strategy adopted, rather than an organizational category. Of relatively modern coinage, the term derives from 'hydroponics', a method of growing crops in artificial conditions, supplying agrochemicals dissolved in water. Some of the earliest organoponicos in Havana were those converted from older hydroponic units that operated in the eighties, but turned defunct when agro-chemicals became scarce.

The organoponicos are generally preferred in areas with infertile soils or paved surfaces, like old car parks and building sites. To overcome such constraints, crops are grown in raised beds or containers, filled with a mixture of organic matter, soil and compost, often including a bottom layer of bagasse, the dry fibrous residue of sugar cane after extracting its juice.

Where the land is unpaved, and the soil suitable, planting in contained spaces with retaining walls is of course unnecessary. Direct planting is then preferred in raised earth beds comprising layers (or a mixture) of soil, organic matter, manure or compost, and frequently topped with a surface mulch of straw or leaves. This strategy offers numerous benefits like: better soil drainage and aeration; replenishing of soil nutrients by recycling crop residues and other locally generated organic 'wastes'; natural *in situ* regeneration of beneficial microbes and soil fauna; and reduced evaporation loss of moisture. Many of these intensively planted gardens, or *huertos intensivos*, use methods similar to the biodynamic approach promoted by John Jeavons, and the French intensive gardening method of Alan Chadwick.<sup>5</sup>

On December 10, 1997, at the opening of the seventh national gathering of *organopónicos* and *huertos intensivos* in Havana, the

Minister of Agriculture, Alfredo Jordan, announced an eleven-point support programme to be implemented over the next five years. Foremost was a commitment to progressively dedicate by 2002, ten sq. meters of land area per city dweller for intensive gardening—3 sq. meters in 1998, 6 sq. meters in 1999, 8 sq. meters in 2000, and finally, 10 sq. meters per urban inhabitant by the end of 2002.<sup>6</sup>

Cuba can now confidently claim to have one of the most successful urban agriculture programmes in the world that continues to maintain high standards of quality in all aspects of production.

#### URBAN AGRO-ECOLOGY: A MORE HOLISTIC PATH

As with rural agriculture, the initial thrust of urban agriculture was the substitution of bio-inputs in place of chemicals. Post-1990, Cuba's large agricultural scientific workforce—mainly trained in the industrial model—now promoted the use of microbial 'bio-fertilisers' and bio-control agents, including 'antagonistic microbes' to check pest incidence.

Given the urgency to increase food production in the face of widespread shortages, the bio-input strategy helped, easing the transition to organic cultivation. But while the microbes introduced into the farm system were from naturally occurring strains, their selective breeding and propagation were narrow-focused measures, far short of a holistic strategy. Gradually, many gardeners discovered that by adopting the poly-cultural, agro-ecological practices of older traditional *campesinos*, the artificial introduction of any microbial 'bio-fertiliser' or bio-control agent was unnecessary.

As seen in the last chapter, Cuban *campesinos*—on privately tended small farms—were among the few who had continued mixed cultivation of various crops, rather than adopt the mono-cropping practices of the larger collective or State farms. Such *campesinos* were thus able to teach the small-scale gardeners of Havana a number of beneficial 'companion planting' schemes.

Poly-cultures of diverse species, cultivated organically in

healthy soil, are far less vulnerable to pest damage, particularly if indigenous or locally adapted crop varieties are planted. Time-tested 'good agronomic practices'—soil building techniques, efficient and conservative irrigation, greater care in timely sowing of species and varieties at their most suitable periods, integration of plants that inhibit pest reproduction—all contribute to prevent or minimise pest attacks.

Havana gardeners also learnt that growing various trees helps to increase biological diversity and to provide a habitat for pest predators. Surrounding cultivated plots with 'live fence' barriers of native, self-seeded species, or flowers like marigold; and occasionally using botanicals like Neem, similarly check the build-up of pest populations.



An organoponico in the outskirts of Havana.  
Photograph : Eduardo Martino

The pooled contributions of thousands of Cuban *campesinos* and urban gardeners—in seed procurement, propagation and sharing—frontally addressed the common lack of crop diversity, colonially induced by centuries of mono-cropping for export. The small-scale, intensive cultivators brought back many neglected crops and crop varieties, and introduced new ones. This has increased resistance to pests and diseases. There is

greater security too that despite climatic vagaries, some of the crops will still provide fair yields.

In 1996, the Department of Urban Agriculture together with the 'Green Team', a voluntary group, organised a three-week seed saving workshop for city gardeners, conducted by Jude and Michel Fanton, the founders of the Australian Seed Savers' Network. Following this, many shorter, basic training sessions in seed selection and preservation were offered all over Havana by urban horticultural clubs and extension workers of the city's agriculture department.

Seed saving soon became the norm rather than exception, and a seed savers' network evolved to facilitate seed exchange. This has enhanced local self-reliance, while the plant varieties selected and preserved—by the gardeners and *campesinos* themselves—are better adapted to the specific conditions of each site.

Agro-ecological strategies are proving effective in addressing yet another limiting factor—the inadequate availability of water for irrigating Havana's gardens. A massive drive to plant a few million trees in and around Havana, and to reforest the main watershed supplying the city, has significantly enhanced aquifer recharge and raised groundwater levels. Large numbers of local storage tanks have been built, allowing gardeners more flexibility in irrigating their crops according to need.

At the same time, appropriate cultural methods have helped to maximize irrigation efficiency. The dense intercropping of diverse plants, optimally utilises available moisture. Together with the mulching of crop residues, this shades the soil, reduces evaporation, checks erosion, and augments biomass availability to regenerate moisture absorbent soil humus.<sup>7</sup>

Trees, natural hedges, and multi-storey cropping systems also help retain transpired micro-climatic humidity, better shielded from wind or sun. The atmospheric vapour trapped in the under-canopy is re-absorbed by soil humus, reducing irrigation needs.<sup>8</sup> Dew condensation too increases with more foliage. Further, a number of native or locally adapted crops have the vigour of untended forest plants, requiring very little or no

irrigation. These are generally preferred by gardeners, especially in water-scarce conditions.

## URBAN SYNERGIES IN CULTIVATION

The Cuban cityscape merges imperceptibly into the rural in a progressive continuum as one moves outward from the city centre to the periphery. The diversity of conditions offers challenges and opportunities for a whole range of gardening strategies.

Though in many urban centres around the world, sprawling jungles of concrete have banished agriculture, the presence of concentrated human settlements near cultivated areas offers several advantages in improving crop yields. Foremost is the high volume of various organic wastes readily available to improve soil fertility. The urban water delivery systems facilitate the provision of protective irrigation. Near constant human presence enables close observation and prompt tending to plant needs. Labour shortage is scarcely a limiting factor—at least with Cuban city gardening. But with Cuba's rural agriculture in thinly populated areas, an insufficient workforce yet remains a significant handicap, slowing the pace of agro-ecological evolution.<sup>9</sup>

While available sunlight for photosynthesis sets an upper limit to vegetative production, actual crop yields commonly fall far short of this theoretical maximum potential, which is most closely approximated in thick natural forests.<sup>10</sup> Critical in optimising agricultural productivity through intensive, mixed cultivation are the local supply of labour, biomass, biodiversity and water. The synergistic benefits that are then possible, are greatly enhanced by an agro-ecological approach. Such integrated systems are also far more sustainable and regenerative of local natural resources.

With tree crops and perennials, the labour requirement progressively diminishes as these crops mature, until finally, little or nothing needs to be done for them.<sup>11</sup> But with shorter duration seasonal or annual crops, considerable attention and labour input remain necessary, year after year. Consequently,

well-planned urban or semi-urban areas with open spaces and collaborative communities have significant advantages over thinly populated rural areas in food cultivation, including proximity to an assured market. But of course, this may not apply where the density of rural population is fairly high.

#### SMALL IS BEAUTIFUL AND EFFICIENT!

All over the world, it is the small-scale, intensively planted polycultural gardens, homesteads and farms that have consistently recorded the highest levels of productivity per unit area of land. The phenomenal yields attained by the urban family gardens of Havana demolish the myth that “small agricultural plots suffer from dis-economies of scale.”

Sinan Koont reports that by 2003, over 18,000 hectares were under urban cultivation in Cuba, and the number of household patio gardens had exceeded 300,000!<sup>12</sup> These small family gardens were collectively producing more than the bigger *organoponicos* and *huertos intensivos* combined, which together covered a larger total area!<sup>13</sup> The food output of Havana Province reached 943 grams per capita per day in 2003.<sup>14</sup> Urban organic agriculture was now supplying 60% of all vegetables consumed throughout Cuba.<sup>15</sup> Three years later, in 2006, its total production surpassed 3 million tons.

In comparison, the oft-spouted economies of large-scale agriculture are, at best, deceptively calculated, and only operate under conditions of high mechanization, high external inputs, massive subsidies, liberal credit, huge land holdings, and a scant labour force. They also ignore vital environmental, social and health costs like soil degradation and loss of fertility, spiralling input needs and costs, mounting toxic residues in food, progressive depletion and contamination of water bodies, high energy inefficiencies, labour displacement and alienation, increased external dependence, vulnerability and indebtedness, distress migration, and rising rates of disease, suicide, crime, . . .

Cuba has walked the opposite path. By supporting small-scale organic farming in both rural and urban areas, and increasingly

adopting holistic ecological strategies, it has been able to check and reverse the above negative trends that are still rising ominously, worldwide!

[Note: Much of the information in this chapter is drawn from ‘Cultivating Havana’ by Catherine Murphy, an abridged version of which is provided at Appendix IV. Where another source is cited, its reference is stated.]

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FIVE



## The Fruits of the Organic Revolution

*S*ome are cynical of Cuba's turnaround and its relevance to the rest of the world. They argue that "the grapes turned sour" with industrial agriculture, only because agro-chemicals and fossil fuels became unavailable to the Cubans. Consequently, their organic 'revolution' has no great global significance.

It is of course uncontroversial that the radical transformation of Cuban farming from the early nineties, was primarily a compulsion of drastically altered external circumstances. The new upheaval was not born of the kind of revolutionary zeal that overthrew the Batista regime three decades earlier.

It is also true that in the sixties and seventies, many Cubans considered the inorganic method a big leap in agriculture. But by the early eighties, the glossy fruits of modern industrial farming had already begun to sour. Then onward, it was increasingly evident that the agro-ecological conditions needed for sustained, quality yields were progressively worsening.

Arguably, a 'deficit agriculture' that eroded the ecological capital of farmers—plundering future generations—should not have clouded the vision of farsighted revolutionaries. But immediate economic and political compulsions demanded a continued reliance on sugar cane monocropping. Cuba thus traded sugar for oil and everything else, until fundamental

re-orientation became a sheer necessity, dictated by new historical realities.

The more critical question regarding the wider relevance of Cuba's organic revolution, whether voluntary or forced, is: Can organic agriculture succeed on a broad scale to provide enough food for an entire nation?

The Cuban experience showed that the organic approach not only enhanced its national food security, productivity and diversity—to better meet the nutritional needs of all the people—but also enabled vital other ecological, social and economic benefits.

It is evident that in the present era of globalised commerce, the policies of most nations are driven by the "financial bottom line", far more than any other criteria. But economies do not operate in a vacuum. Even the most hard-nosed planners must now concede that ignoring basic social and ecological considerations—including the rapid depletion and degradation of natural resources—is an invitation to disaster "across the board."

### FOOD YIELDS

In Cuba, after the sudden, severe scarcity of food in the early 1990s—when most Cubans shed between 10 and 30 pounds in weight!—farm yields steadily increased.

In 1999, the UN Food and Agriculture Organization (FAO) reported that in just 5 years since 1994, Cuba's vegetable production had more than quadrupled, the yield of tubers and plantains tripled, cereal production increased by 80 percent, bean yields by 60 percent, citrus by 110 percent.<sup>1</sup> And farm output continued to rise.

By mid-2000, nationwide yields and consumption of fresh vegetables and herbs had reached an average of 469 grams per day—for each man, woman, and child—well above the FAO recommendation of 300 grams per day.<sup>2</sup> Three years later, the province of Havana was producing 943 grams of vegetables and greens per capita per day!<sup>3</sup> The harvests of fruit also saw at least

double-digit percentage rates of annual growth, while the increase in rice yields was 70% in 4 years after the introduction of the Madagascar 'System of Rice Intensification.'<sup>4</sup>

Before the end of the millennium, the daily food availability per person in Cuba was already 2,600 k-calories, and more than 68 grams of protein.<sup>5</sup> The UN's Food and Agriculture Organization recommends a daily average of 2,400 k-calories and 72 grams protein per individual, while admitting that this would vary, depending on age, body size, climate and lifestyle factors. (The normal protein requirement of a diminutive Indian woman is considerably less than that of a strapping male westerner.)

#### HEALTH BENEFITS

While the Cubans long had a weakness for meat, they now consume far more fresh-grown produce than they ever did. "Ironically, one of the good things about the American blockade is that people are eating much better!"

The infant mortality rate in Cuba is lower than in the US, while the average life expectancy of 76 years is about the same, despite being economically beleaguered by nearly fifty years of the US embargo.<sup>6</sup> During the severe crisis following the Soviet collapse, Cuba's population increased from 10.7 million in 1990 to 11.2 million in 2002. But in the same period, the number of undernourished or malnourished Cubans declined by half—from 0.8 million in 1990 to 0.4 million in 2002—a remarkable achievement, even under more favourable circumstances.

In stark contrast is the rampant malnourishment (as distinct from hunger)—and pathological obesity, diabetes, heart ailments, etc.—plaguing many millions all over USA. Much of this, I believe, is brought about by commercially induced consumption and lifestyle habits, as advertising and marketing strategies cynically manipulate and perpetuate a fairly pervasive poverty of health awareness. The corporate medical world then thrives on the chronic debilitating illnesses that have assumed epidemic proportions in recent decades. The huge turnover of

the 'disease industry' is claimed in turn to represent "a healthy boost to the national GDP." By an economic sleight of hand, ever-mounting painful costs come out flamboyantly dressed as benefits!

Cuba's approach to healthcare—since the nineties—has emphasized prevention of disease through keeping the people healthy. A major effort is to promote a wholesome, balanced diet. Most Cubans now eat largely vegetarian, low-fat food, although this is still perhaps determined more by availability (and increased health consciousness) rather than long conditioned culinary preference.

The January 2006 issue of the American Journal of Public Health reported that by 2002, the incidence of cardiovascular diseases, a leading cause of death in modern times, had declined in Cuba by 45% (from what was reported in 1970) while it is still rising globally!<sup>7</sup> The authors add that the level of control of hypertension achieved in this country is perhaps the highest in the world.<sup>8</sup>

Clearly, the qualitative improvement in diet and the wider availability of a larger variety of foods, with a greatly increased proportion of fresh fruit, vegetables and leafy greens—all organic, and hence free of toxins—has brought major health benefits to the Cubans. They also have a more active, outdoor lifestyle, including walking and bicycling, that is much less sedentary than that of the Americans.

Dr. Fernando Funes Sr. relates, "As we were out of medicines, we started growing more medicinal plants for both preventive and curative purposes."<sup>9</sup> In less than a decade, many Cubans had their own homegrown dispensary of herbs—for at least the common ailments. Even MDs (allopathic Doctors of Medicine) soon found themselves more comfortable prescribing these gentler remedies, along with dietary corrections!

Cuba has an international medical college. Surprisingly, it used to attract hundreds of American students, who would attend at 'no charge' under the condition they work in poor neighborhoods when they return to their country!<sup>10</sup> (Medical students from many other nations too are admitted free under

similar commitment, without paying any tuition fee.) However, the number of students from the US sharply declined after Bush banned all travel to Cuba—even for educational purposes—in early 2004.

Cuba, incidentally, has a surplus of doctors and trained nurses, who are loaned to other poor countries. Here, they usually live in the community with which they work, and prefer to treat or counsel their patients at their homes rather than a hospital. There are 20,000 such Cuban health professionals abroad (largely in Latin America) doing this kind of work. Their major emphasis is on preventive medicine—trying to keep the people healthy—rather than just treating medical problems after the symptoms have manifested.<sup>11</sup>

In recent years, Cuba has witnessed too a significant rise in more lucrative ‘health tourism’, with a number of specialist hospitals, clinics, health spas and resorts catering to foreign visitors. Patients travel to Cuba for a wide range of treatments, including eye-surgery, orthopaedics, and for neurological disorders like multiple sclerosis and Parkinson’s disease.<sup>12</sup> While the majority of ‘health tourists’ are from South America, the unique Cuban treatment for *retinitis pigmentosa*, or night blindness, has also attracted many patients from Europe and North America.<sup>13</sup>

#### FOOD SHARING AND COMMUNITY SPIRIT

Apart from what is available in the open market, the State provides—each month—free supply of 13 lbs. of food for every child in childcare centres, 10 lbs. per student to schools, and 28 lbs. per resident patient to hospitals. Maternity homes and homes for the aged similarly receive preferential provisioning. For other Cuban citizens, the State rationing system (in 1998) assured a minimum supply of 5 lbs. of rice, 1 lb. of beans, and 3 lbs. of sugar per head per month.<sup>14</sup>

There are also voluntary distributions of food, especially of the harvest from the *parcelas*, or popular gardens. Much of this happens spontaneously, as urban farmers share their bounty

with needy neighbours out of social solidarity. Some local governments, however, proactively expect “voluntary” contributions to local schools and hospitals—as a kind of ‘social rent’ where land is allotted free for cultivation.

Several investigators have reported that the majority of Havana’s gardeners regularly gifted a fair part of their produce to old and low-income neighbours. Donations were also made to primary schools, day care centres, and retirement homes in the locality.<sup>15</sup> Such sharing of food—even when it was yet scarce!—unmistakably demonstrated the resilient community spirit of the Cuban people, helping them survive the worst moments of the economic crisis.

One urban gardener explained why he never raised a fence to guard his produce from theft. “I taught the children on my block about the garden and the different crops growing in it. I paid them a little for helping me, and gave them food to carry home for their families. Building relationships is far more rewarding than erecting barriers!”

City gardening has proved to be a particularly effective medium for community empowerment. It offers satisfying work for all sections, old and young. “The teenagers and kids learn important lessons and skills; there is a creative outlet for their brimming energies. We also have a great time together!”

Urban food gardens provide older people too an opportunity to interact with neighbours, talk about common problems, and collectively find solutions. A reviewer of the fast-growing city gardening movement in many parts of the world observes, “the shared challenges force people to find resources and allies they would not otherwise have sought out, and this goes well beyond the particulars of gardening. . . . Any experience is heartening that leads people to believe they have some power to make decisions about what they want their lives, neighborhoods, and maybe even a future society to look like.”

#### LIFE AFTER OIL

About 98% of Cuba’s oil supply, before the crisis, was imported

from the Soviet Bloc.<sup>16</sup> When this dried up, almost every sector of the country's economy and society was thrown into disarray.

"Imagine an airplane suddenly losing its engines," relates Jorge Mario, a Cuban economist. "It was quite a crash, . . . (that plunged) Cuba into a state of shock. There were 16 hours of daily blackouts in its oil-fed electric power grid. . . . Factories became silent as graveyards."<sup>17</sup> Normal life came to a near standstill.

As Cuba's electricity had been almost entirely generated from imported oil, scheduled rolling power cuts became routine. "Without refrigerators, food would spoil; without fans, the afternoon heat could be very trying at times."

Entire industries were paralysed, rendering large numbers of people without work. Food scarcity was aggravated by a lack of fuel for transporting any surplus from the farms to the consumers. The crisis was total, and the challenges it threw up demanded a total overhaul. Of course, many people were demoralised. The trickle of migration out of the country became a steady stream. But of those that stayed, sufficient numbers rallied determinedly around the cry *Sí, se puede*—"Yes, it can be done!"

Like the proverbial ostrich with its head buried in sand, most people elsewhere in the world recoil from considering that oil is a fast depleting non-renewable resource; and that consequently, a severe energy crisis may overtake us too, probably sooner than later. With the latest of the long anticipated great spikes in fuel prices, crude oil has been consistently trading at over \$100 per barrel in 2008, rising to \$140 in July, 2008. In December 1998, the price hovered around \$10 per barrel.<sup>18</sup> We have thus witnessed a fourteen-fold increase in the past decade! Some, like Goldman Sachs, forecast that—with the gap between supply and demand further widening—oil prices could relentlessly climb to \$200 per barrel in two years, or perhaps sooner if existing supplies are disrupted!

## CYCLES & 'CAMELS'

When Cuba's oil imports were throttled in the early nineties, transportation ground to a near halt. "There were no cars running, public conveyance collapsed, and the streets were empty!" What little supply of oil that Cuba had, was inevitably prioritised for the most important tasks.

People walked. They had no choice. Around 1993, Cuba imported two million heavy Chinese bicycles.

For longer distance conveyance, the pressing challenge was to maximise the fuel efficiency of communal transportation. Trucks were converted to passenger vehicles by simply welding steps to the back, so that people could climb and alight easily. Very little else was needed, besides a bare skeletal frame of rods, and a canopy for shade.

The concept was subsequently refined into Cuba's indigenous mass transit bus, called the 'Camel'. Built on a long chassis vehicle, the 'Camellone' could accommodate over 250 people and cost just one peso (about a nickel) per ride! With little money or fuel, Cuba thus managed to transport large numbers



The 'Camel' – a mass transit bus in Havana

of people during rush hour in Havana. "Necessity," as the Cubans often say, "is the mother of invention!"

For shorter distances, the cities offer (cycle and auto) rickshaws, a boon to the aged and infirm, who—by an unwritten law—have priority. In smaller towns, horse-drawn or even mule-drawn 'cabs' may be spotted, while in Havana, dozens of vintage American cars from the 1950s—commanding antique value but used as taxis!—are another quaint sight for visitors.

Car-pooling and ride sharing are the prevalent norm everywhere in Cuba—for high level state functionaries as well. There are designated government officials in yellow garb who have the right to pull over even government vehicles and fill them with any people who need a ride.

#### REVERSE MIGRATION: NEW WORK IN A NEW ECONOMY

The three decades following the 1959 Revolution, when Cuba mechanised its agriculture, had witnessed a broad-scale exodus from the countryside to the city. Not only did the work available on farms sharply decline in that period, but urban opportunities and lifestyles became more attractive. In 1956, over 56 percent of the population was rural. But by 1989 that had halved to 28 percent, greatly increasing the pressure on cities.<sup>19</sup>

Prior to the crisis, farmers' sons and daughters, who completed school, did not want to take up agriculture, as there was no incentive to do so. Nor did they have any attachment to their rural roots. A subconsciously conditioned urban bias led them to associate farming with poverty, underdevelopment and the olden days of slavery. They saw no joy or satisfaction either in the modern way of tending to unending hectares of monocultures like sugar cane or other cash crops.

After the food scarcity of the early 1990s, there has been a marked change in people's attitude to farming. Thousands of families are reported to have migrated out from city centres to outlying fringes or more distant rural areas to make their living from the land. Many thousands have found new avenues of work

in organoponics and other forms of urban or suburban agriculture.<sup>20</sup>

Today, agriculture pays well and many farmers are in the top 10% of income earners, ahead of professionals like doctors and academics! Of course, government support through making land and basic services available—and opening many farmers' markets at deregulated prices—has helped a great deal. But most significantly, the daily shortages of food made the Cubans value more dearly what they once took for granted.

By 2003, Havana alone had over 200,000 full-time workers employed in its city-farming sector, including almost 10,000 professionals and over 40,000 technicians. Many more people found part-time work in small-scale kitchen gardening, or in marketing food and other related activities. The year 2003 also saw about 35,000 new garden jobs—or 22% of all new employment opportunities—created in Havana over the previous year.<sup>21</sup>

As seen earlier, the huge farms owned and managed by the State had covered 82 percent of Cuba's agricultural land before the crisis. As they were highly mechanized, their employment potential was low. Post 1990, they totally collapsed. The small and medium farms—following traditional mixed cropping methods—were far more resilient and productive. But they covered only 12% of Cuba's arable area in the early years of the 'Special Period'.

In 1993, the government broke up 60% of the State farms into private UBPC workers' collectives. By late spring of 1994, all of its sugar farms had been transformed into these 'Basic Units of Cooperative Production'. Before the end of 1998, most of the large non-sugar State farms were also dismantled. Many Cubans were allotted independent land to cultivate as family farms; and large numbers enrolled in farm collectives.<sup>22</sup> Four years later, the total number of UBPC farm collectives had reached almost 3000.<sup>23</sup>

In 2002, it was decided to wind up almost half of the sick sugar mills as well, and convert the land to food production

and reforestation. The Cuban government offered the mill workers a choice of taking up new work—commonly agriculture related—or learning new skills. In either case, they were guaranteed that they would continue earning at least the same wages they had been receiving.

As Fidel declared, “Possibly the boldest decision recently adopted has been that of turning study into a form of employment, a principle that made it possible to close down 70 sugar mills whose hard-currency costs were higher than the income they generated.”<sup>24</sup>

Through the following years, more sugar mills were wound up, and by 2006, 110 out of Cuba’s 155 sugar mills had been deactivated.<sup>25</sup> As a result, almost one million additional hectares of land became available for growing crops, and for reforestation.

Small-scale, intensive agro-ecological cultivation not only offers a higher employment potential, but also a much higher output per hectare for every unit of material resource invested—including money and energy. For its population size, Cuba has an abundance of land, and a relative scarcity of labour, particularly in its rural areas. There is thus no shortage of useful work available in agro-ecological production and environmental regeneration—including reforestation, conservation of biodiversity, renewable energy, and the harvesting and storage of rainwater.

As insufficient labour for regenerative agriculture came to be recognized as a constraint on its growth, planners sought to encourage city dwellers to move to the countryside. Government programmes were consequently aimed to create more attractive rural housing, supplemented with services. Other inducements too are offered to urbanites to work on farms for periods ranging from two weeks to two years.<sup>26</sup> Some of them then decide to relocate for good, usually joining a land collective they feel comfortable with.

With the burgeoning of Cuba’s tourism industry—the country’s biggest revenue earner—to a remarkable ‘footfall’ of 1.7 million visitors in 2002,<sup>27</sup> large numbers of Cubans have

found profitable employment in this and ancillary sectors. The latter include eco-tourism, cultural tourism, health tourism; as also the production and marketing of various local craft and home industry items that are in high demand among the foreign travelers that Cuba attracts.

## ECONOMIC STABILIZATION

Up until 1989, Cuba’s economy had been anything but self-reliant, especially in essentials like food and energy. “Exporting sugar and ruining one’s land to buy almost everything else, was hazardous stupidity”—as the Cubans realized in hindsight. With the Soviet empire coming apart, suddenly 8 billion dollars a year in foreign trade just evaporated—almost overnight!

For several years after the Soviet collapse, the Cuban economy remained in a state of shock; its currency—the peso—was in a free fall. Combined with the severe scarcity of essential commodities, runaway inflation ruled the day. Between 1991 and 1993, the price rise was a whopping 700 percent in the black market!<sup>28</sup>

At the beginning of 1994, the yet plummeting Cuban peso was trading at 150 to a dollar on the parallel market. But by the end of 1999, it had recovered to 20 pesos to the dollar. The national budget deficit was sharply and progressively reduced from a phenomenal high of 1,500 billion pesos in 1993 to 14.2 billion pesos in 1994, 765.5 million in 1995, 580 million in 1996, and 268 million pesos in 1998. In 2002, the deficit stood at approximately two percent of the GNP, down from 33 percent in 1993.<sup>29</sup>

Until September 1994, rice was still selling at 50 pesos per pound. But with the determined curbing of the budgetary deficit, and the opening of farmers’ markets later that year, the black market for many food items was rapidly undermined. When the new farmers’ markets began, rice opened at 12 pesos per pound. In a few months, it fell further to between 7 and 10 pesos per pound.<sup>30</sup> The prices of other foods also declined steadily.

An important thrust of the new economic policies has been

to vigorously promote the role of women in community decision-making with respect to food security. They have since become skilled workers, technicians, specialists, generalists and able managers in almost all branches of the agricultural sector—providing a major contribution in nurturing it back to health.<sup>31</sup> Many of the women are outstanding gardeners. In service sectors too, like education and research, healthcare, communication, civil administration or tourism—and in the fine arts—women continue to play a leading role. About 60% of Cuba's doctors are women.

#### CULTURE AND EDUCATION

The fine arts, music, literature, theatre, dance, . . . as at least part-time pursuits, are well and thriving. They yet retain a treasured space in the lives of Cubans, and are a greatly welcome relief to foreign visitors, who—back home—have seen the 'insta-pop' consumer culture increasingly displace more authentic expressions of human emotion and yearning.

Since the mid-nineties, the culture of Cuba prominently includes a much greater appreciation of plants and Nature, and care for their conservation and regeneration. Since the ageing of food growers is a worldwide problem, the Cubans realized that creative measures were needed to bring young people back into agriculture. Various programmes were consequently evolved that combined music, dance, story telling and enactment. Two weekly television shows, *Etorno* and *De Sol a Sol*, built a considerable following among the youth. The latter is a regular Sunday night show, followed by a musical programme featuring *Decimas*, traditional *Son*, and other rural music.

However, Cuba also has a thriving pop culture, especially hip-hop, which many young people seem to prefer.<sup>32</sup> This, of course, is not surprising, considering the proximity of USA, and the influence of large numbers of Cubans now living in that country.

Education is the most important social activity in Cuba, and

includes every child. Cuba scores highly in the quality of its education and in its near total adult literacy. Immediately after the 1959 revolution, 120,000 voluntary 'teachers' went out to the hinterlands, and over 700,000 people learned to read and write in a few months. Before the revolution, there was one teacher per 3,000 people. In 2004, the ratio was one for every 42 Cubans, while the ratio of teachers to students was 1 to 16—among the highest in the world. Of late, this is reportedly declining. With employment options again increasing, fewer young people are taking up teaching. As a result, retired teachers are being re-hired to fill vacancies.

A national organization called the Pioneers, offers a free combination summer school and camp during the July-August school holidays. Its main objective is to help children choose a career by experiencing a wide range of options and discovering what they like. The children greatly enjoy these non-academic activities.

Saturday and Sunday at camp are devoted almost entirely to recreation and excursions to the mountains or to the beach. Over the week, much of the time is spent on 'hands-on learning', or learning through work. The subjects covered include agronomy (practical food growing), sea studies (fishing and boating), transportation (including auto repair), embroidery, construction, gastronomy, and plant nurseries. Boys, as well as girls, learn sewing skills, cooking and auto repair. Much importance is given to learning local handicrafts, as the ready cash income from sales to tourists can make a big difference to a family.<sup>33</sup>

A report of a Washington State University Study Tour of Cuba in May 2003, comprising 17 WSU faculty members and agriculturists, relates: "There were four public school teachers among us on our trip. As we returned to the bus (after a visit to a Pioneer camp), two of the four teachers were crying. When we asked why, they said that this was what they had dreamed of when they became teachers, but it was not possible in their schools."<sup>34</sup>

## EXTENSION AND OUTREACH

As part of UNDP's 'Agro-ecological Lighthouse' programme, Cuba's Organic Farming Association, or ACAO, created a number of exemplary farms—to demonstrate their possibilities to other farmers, policy makers, etc.

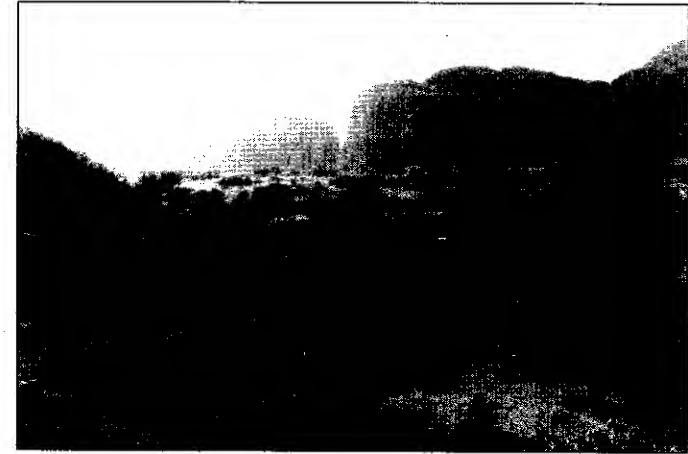
An evaluation of the Lighthouse Programme concludes that its main benefits have been to show that agro-ecological production can provide similar (or superior) yields to conventional methods. It also offers significant economic benefits through cost saving, and major ecological gains through improved soil fertility, regeneration of biodiversity, energy efficiency, and water conservation.

ACAO (subsequently renamed GAO) has held hundreds of workshops around the country. It produces its own magazine—with a good mix of general and technical articles—and has created an accredited agro-ecology course at the Agricultural University of Havana, with more than 500 students enrolled. A network of 10 regional documentation centres has also been established. In addition, ACAO has organised several international conferences on organic farming, hosted numerous delegations from around the world, and helped to develop a master's Degree in Sustainable Development at the University of Havana.

Cuba's outreach efforts to farmers and urban gardeners have engaged a number of countries, educating them on the concept of biodiversity as a productivity enhancing strategy.<sup>35</sup> Inspired by Havana's example, the first Venezuelan organopónico was inaugurated in the center of Caracas on March 31, 2003 by President Hugo Chavez in the presence of the Cuban ambassador and the FAO representative in Venezuela. Since then, urban agriculture has grown significantly in Venezuela. Within Latin America, Argentina is another nation with a strong city farming movement. As for rural agro-ecological concepts, these are steadily finding wider acceptance and adoption—now even as state policy—in many South American countries.

## SUSTAINABILITY

The 'double-whammy' of food and fuel shortages spurred Cuba to make remarkable strides in attaining a level of sustainability that perhaps no other nation presently rivals. Whereas most 'developing' countries, including India and China, are yet on a path of relentless degradation and depletion of their natural wealth, Cuba is unique in reversing the negative trend to one of regeneration.



An agro-ecological landscape in rural Cuba  
Photograph : Lisa R. Wolfe

Without doubt, the most significant contribution has been through adopting agro-ecology as the guiding principle and cornerstone of the nation's agricultural and development policy. Agro-ecology sees nature as an integral unity of interrelated elements and functions, all of which are vital to the healthy functioning of farm and human ecosystems. This perspective is in sharp contrast to the modern economic view of land as mere property and resource, whose essential value is monetary.

The Cubans' agrarian, low-energy, cooperative life style is thus far more compatible with sustainability than is the 'modern



economic society' of growth, competition and consumption, dependent on an illusory never-shrinking supply of fossil fuels.

Cuba has been described as "the most un-consumer place I have ever been in the west." The reviewer adds, "Without advertisements cultivating endless needs, the limited material resources are not as psychologically debilitating as they would be in the US. . . . (The people) told us that things were difficult, but they also expressed what they were proud of—quality education, free health care, long life expectancy, excellence in sports, and their survival in spite of the US embargo. Some even said they thought the embargo had made Cuba stronger."

In 2006, the international 'Living Planet' report of the WWF (World Wide Fund for Nature) and the Global Footprint Network, declared that Cuba was the *only* nation on earth to have truly achieved sustainable development. The criteria adopted in the study included both the 'Human Development Index' established by the United Nations, as well as an evaluation of each nation's 'ecological footprint'. Cuba emerged as the only country to score highly on both counts.

The 'Living Planet' report of 2006 testifies to the Cubans' high level of literacy, long life expectancy, and low per capita consumption of non-renewable mineral and energy resources. It notes the universal entitlement and coverage of quality education and healthcare in Cuba. The report credits too the country's steady progress in reforestation and the high efficiency levels attained in the conservation and regeneration of soil, biodiversity and water. (Interestingly, the report mentions that Latin America is the region that leads the world in sustainable development.)

#### FUTURE CHALLENGES

In past years, several observers believed that if the US embargo on Cuba was lifted, a flood of cheap foods and agro-chemical inputs—massively subsidised by the US government—could easily out-compete Cuba's locally produced organic foods and bio-inputs. The forced depression in the prices of such domestic

products would render them economically unviable. This may then trigger a renewed exodus to urban areas and non-agricultural occupations; perhaps even a resumed use of chemical inputs in Cuban agriculture.<sup>36</sup>

Such may have been the possible outcome until just a year or two ago, had the US lifted its embargo. But now, midway into 2008, the prices of fossil fuels have increased sharply, and continue to rise inexorably. The prices of agricultural commodities too have mounted globally.

The conversion of massive acreages of arable land in the US and elsewhere to bio-fuel production—including ethanol processed from corn and other crops—has further contributed to steep rises in food prices, and declining surplus for export. In such a changed scenario, it is a moot question if the US could yet 'kill' organic agriculture in Cuba—as easily as in the past—by merely lifting its embargo. The age of 'strategic global dumping' of artificially cheap farm produce does seem to have passed, though this may yet prove to be wishful thinking.

It is conceivable too that the US—faced with its worst recession since the Great Depression of the 1930s—may turn its attention inward to its own economic recovery under the shadow of a looming energy and fiscal crisis and declining dollar. A phased reduction of the many billions of dollars spent annually to subsidise US agriculture could then become inevitable if present economic trends continue, as seems likely. In such a situation, a lifting of the US embargo may well offer an attractive opening for Cuban export of organic food a short distance across the sea to the US, where it commands a significantly higher price. However, such export would need to meet strict standards and procedures required for certification of the produce as organic. A more serious hurdle yet to organic production on a sufficiently large scale for export, is Cuba's labour shortage, exacerbated by an ageing population.

The rationale for wider adoption of organic ecological strategies the world over, is increasingly compelling. While the long-acknowledged problems of chemical industrial agriculture have been intensifying with each passing year, the significant

contribution of such a technology to potentially disastrous global warming is also now recognized. Of critical significance though, in the near future, is the skyrocketing price of fossil fuels under a yawning demand-supply gap.

As with Cuba in the past, fundamental change at a global level seems more likely under compulsion rather than voluntary choice. But *when* (no longer *if*) such change gathers greater momentum, organic farmers everywhere will be swamped with work and new challenges. Cuba's organic revolution may then serve as a beacon to a sane, sustainable future.

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## EPILOGUE



### The Emerging Global Scenario

*In* the past two years, the prices of food and fuel increased more than they have in several decades combined! The diversion of crops like maize and sugar cane for producing ethanol, and the planting of massive acreages to bio-fuels like *Jatropha curcas*, greatly aggravated the global food crisis.

Twenty percent of the maize (corn) harvested across the US last year went to ethanol – to fuel 2% of US automobile use! Bush called for producing 35 billion gallons of ‘non-fossil transport fuels’ to meet 20% of that country’s requirement by 2017. India aims to plant 35 million acres (140,000 sq km) to bio-fuel crops like *Jatropha*; Brazil as much as 300 million acres (1.2 million sq km). Southern Africa—targeting a billion acres (4 million sq km)—is being touted as the future “Middle East of bio-fuels”!<sup>1</sup> The grotesque competition between automobile owners and the underfed of the world is unequal, to say the least.

Even before the frenzied rush for bio-fuels, it was reckoned that over 850 million people on earth were undernourished. With food supplies now dearer, at least a hundred and fifty million more will swell the legions of the underfed.

July 30, 2008 saw the Doha round of WTO collapse. The USA & EU failed to persuade a hundred or so developing countries to abandon ‘protection measures’ for their farmers, while the rich nations of OECD themselves continued farm subsidies of \$374 billion each year! An additional \$307 billion of agricultural support

over the next 5 years is proposed in the US Farm Bill of 2008.<sup>2</sup>

While India held firm to a principled stand in food trade negotiations, it threw all caution to the wind in introducing a bill for a single window, fast track clearance of GM crops—even in the absence of safety evaluations.

On the bright side has been the release of the 2,500-page IAASTD report in April 2008, following four years of study and deliberation by an international panel of more than 400 agricultural scientists. Undertaken on a scale comparable to the Intergovernmental Panel on Climate Change, the ‘International Assessment of Agricultural Science and Technology for Development’ (IAASTD) included representatives of governments, civil society, private sector and scientific institutions from around the world, as well as the World Bank, FAO, UNDP, UNEP and WHO.

Sixty countries adopted the IAASTD report, which recommends that small-scale farmers and agro-ecological methods are the way forward, with indigenous knowledge playing an important role. It notes that genetically modified (GM) crops are highly controversial, and not the answer to hunger, poverty or climate change. Much more research is needed to establish whether they offer significant benefits, and do not harm the health of humans, animals or the environment.

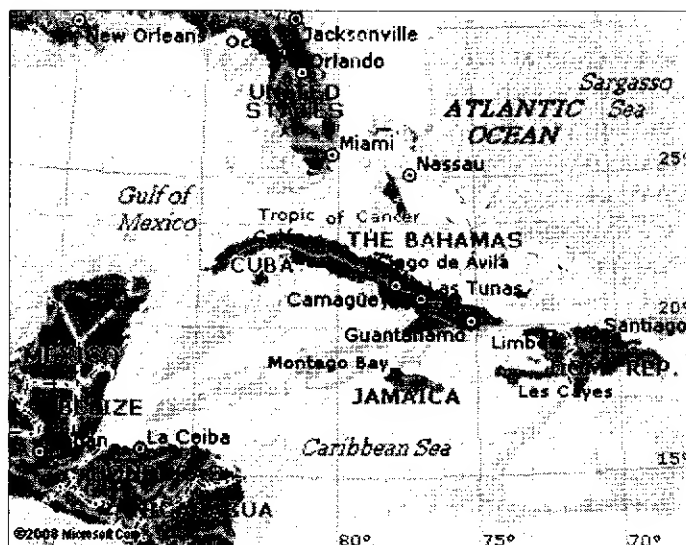
In contrast, integrated agro-ecological systems offer multiple verifiable benefits, including enhanced productivity, reduced costs, healthier food, and the regeneration of soil, biodiversity and ground water. Fossil fuel inputs and greenhouse gas emissions are significantly reduced, while energy efficiency and carbon sequestration are much higher—vital considerations in an age of fuel scarcity and global warming. Clearly, it’s time to get off the drunken dragon of corporate driven industrial agriculture!

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## APPENDIX I

## Cuban Geography and Agro-climate



Cuba in the Caribbean

The Cuban Archipelago in the Caribbean Sea—lying between the two Americas—consists of the main large Isle of Cuba, the Isle of Youth, and about 1,600 other small islands. The mainland has an overall length of 1,250 kilometers, with an average width

of 97 kilometers, tapering to about 31 kilometers towards the west, and widening to around 191 kilometers towards the east. The 3,500 km coastline has more than 200 harbours, bays and coves, facilitating sea transport, though coral reefs abound, requiring careful navigation.

Cuba's population in 2001 was 11,142,600, with a density of a little more than 100 inhabitants per square kilometer. Seventy-four percent of the population is urban. The most important cities, connected by some 5,700 km of railway, are on average less than 40 km from the coast. Havana is the capital, and the official language is Spanish. The ethnic composition is 66 percent Caucasian, 21.9 percent *mestizo*, 12 percent black and 0.1 percent Asian.

The country has a tropical climate characterized by abundant rainfall between May and October, with 80 percent of the 1,300 mm annual average precipitation falling during these six months. In the dry season from November to April, the rainfall is sparse and irregular. The annual mean temperature is 25 degrees Celsius, with little fluctuation, ranging between 23 degrees and 27 degrees over the whole year. The average relative humidity is 80 percent. The predominant soil types are oxisols and ultisols (68 percent), with some inceptisols (16 percent) and vertisols (16 percent).

With a total area of 110,860 sq. km, the country is dominated by expansive plains covering about 80% of the land. There are three mountain ranges, and a total of 48 well-defined natural regions, each with specific characteristics of climate, vegetation, and landscape, ranging from rainforest to semi-desert. Such variation favours a high natural biodiversity—19,631 known plant and animal species, of which 42.7% are endemic.

Approximately 60% of the land, or 6.7 million hectares out of 11 million hectares, is suitable for agriculture, but less than 5 million hectares is actually under cultivation. 15% is of 'high fertility', 24% 'fair fertility', 45% 'low fertility', and 14% 'very poor fertility'. Of the remaining uncultivable land, forests cover 2.6 million hectares. About half a million hectares is used for reservoirs.

The major food crops are: rice, corn, cassava, various roots and tubers, beans, plantains, tropical fruits (particularly citrus), and a variety of vegetables—all a part of present Cuban diet. The 'cash-crops', sugar cane and tobacco, are still grown, though much less than in the 1980s, while the yield of organic herbal 'green medicine' plants is on the rise. Much of the sugar too is now organic.

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#### APPENDIX 2

### The Organic Farming Movement in Cuba

DR. FERNANDO FUNES AGUILAR  
(Former President of the  
Cuban Organic Farming Association)

Organic farming is now recognized as a strong international movement. There is great concern around the world for the serious environmental problems resulting from the industrial agriculture model. These have included erosion, salinity, and infertility in a large portion of our agricultural soils, the loss of biodiversity, growing deforestation, and mounting socio-economic problems in rural regions, including mass migration to cities.

In the early nineties, when Cuba was hit by the economic crisis triggered by the Soviet collapse, the nation set for itself the following urgent priorities to overcome food shortages:

1. Decentralization of the state farm sector through new organizational forms and production structures;
2. Land distribution to encourage the growing of different crops in various regions of the country;
3. Reduction of specialization in agricultural production;
4. Increased use of animal traction, bio-fertilisers and biological pest control;

5. Promotion of urban, family, and community gardening movements;
6. Opening of farmers' markets under 'supply and demand' conditions.

The Ministry of Agriculture (MINAG) emphasised the rational use of farmland, water, and technical supplies. It geared efforts to conserving the soil and the genetic stock of domestic and wild flora and fauna, including the preservation and use of resistant plant varieties and seeds in agriculture and forestry.

The National Association of Small Farmers (ANAP) had already been providing organizational support for training, promotion and marketing. This helped its members preserve much of Cuba's farming traditions, experiences, and culture, which have been and continue to be of great importance for the shift to sustainable, ecological agriculture. The extraordinary work of the movement's precursors, together with the contributions of thousands of peasants and small farmers, imparted the key knowledge, ideas, and experiences that have forged Cuba's organic farming movement and its basic principles.

In 1992, a group of professors and researchers joined together at the Agrarian University of Havana to discuss agro-ecological ideas. They organized the First National Conference on Organic Agriculture in May 1993, and helped start the Cuban Organic Farming Association, ACAO (subsequently renamed GAO). Its objectives were:

- to develop a national consciousness of the need for an agricultural system in harmony with both humans and nature, while producing sufficient, affordable, and healthy food in an economically viable manner;
- to develop local agro-ecological projects, and promote education and training;
- to stimulate agro-ecological research, and the recovery of the principles on which traditional production systems have been based;
- to publicise the importance of marketing organic products.

Since the founding of ACAO, a strong effort has grown through workshops, field trips, meetings with farmers, talks and conferences at universities and research centers, as well as portable agro-ecological libraries which rotate through different research and education centers, agricultural cooperatives, and other interested institutions. ACAO also took up the challenge to create in different regions 'Agro-ecological Lighthouses' or demonstration farms where agro-ecological concepts are applied and sustainable systems promoted.

At the national school for farmers of ANAP (Cuba's Association of Small Farmers), conferences, participatory meetings, and discussions of videos have been organized on theoretical and practical topics. Many courses and workshops on agro-ecology and organic agriculture have been held in different provinces of the country.

In 1995, Cuba hosted its Second National Conference on Organic Agriculture. This was followed by the Third National Conference in 1997, where more than 400 delegates (180 foreigners and 240 Cubans) participated for three days.

The Center for Sustainable Agriculture Studies (CEAS) at the Agrarian University of Havana began Master's and Ph.D. programs in Agro-ecology. Since 1997, it also offers an annual correspondence course on Agro-ecology, which has a high level of participation throughout the country.

The magazine *Agricultura Organica* (Organic Farming) commenced publication three times a year in 1995. Its objective has been to analyze, debate, and disseminate different aspects of organic agriculture and its advances, as well as news of low external input and agro-ecological methods that enhance system sustainability. Environmental, social and economic topics are also discussed, especially in light of the problems associated with conventional agriculture in different parts of the world. A broad national and international readership indicates the high level of acceptance of this magazine.

In April 1999, ACAO changed its name upon joining, and becoming a section of, the Cuban Association of Agricultural and Forestry Technicians (ACTAF), where it is now called the

Organic Farming Group (GAO), achieving officially recognized status in the country. GAO continues to work under the same premises of the promotion and development of agro-ecological agriculture.

In December 1999, GAO was awarded the 'Alternative Nobel Prize', or Right Livelihood Award, in a solemn session of the Swedish Parliament—for its work in disseminating and promoting organic agriculture.

Increasingly, people came to believe that productive harvests could be obtained on positive cost-benefit terms, while protecting the environment and nature, without polluting soils, water and air, yet producing healthy foods without excessive energy use, and with reduced capital investment.

In advancing the cause of organic farming, it was essential to rely on the alternatives that different research centers had been experimenting with for a number of years, as well as on recapturing the experiences of *campesino* farmers who had knowledge that had been passed down from former generations, but which had been 'forgotten' or displaced by conventional agriculture.

We should also admit at this point that the main techniques widely applied until recent times have largely been of the 'input substitution' or 'horizontal conversion' varieties (reduced input use, soil recovery techniques, etc.) Such a narrow technical focus has not yet allowed us to take significant advantage of the enhanced processes of synergy that would be made possible in a more completely agro-ecological conception of agricultural development. Nevertheless, this first phase has been extremely important in effectively meeting today's set of challenges. It has provided the basis for the widespread consolidation of organic farming over a large scale.

Some of the current beneficial practices and ongoing programs include:

#### CROP ROTATION AND POLY-CULTURE

Both methods are commonly used in organic agriculture, and

our work has shown positive results, particularly in regard to land use and crop yields. Different poly-cultures or intercrops have been very good for improving soil coverage and quality, with land equivalent ratios (LERs) ranging from 1.01 to more than 3.0. Both rotation and poly-culture have played key roles in controlling harmful pests and diseases, and have helped guarantee the required food supply in recent years. While there are many research centers studying these topics, with important results, it has been the *campesinos*—who never abandoned these practices—who have made the greatest contributions.

#### LEGUME-BASED SYSTEMS, SILVO-PASTORAL SYSTEMS AND INTEGRATED CROP-LIVESTOCK SYSTEMS

Steps have been taken to increase the use of legumes in protein banks; to generate locally adapted breeds and crosses for all livestock species; and to re-popularise free range rearing of poultry and pigs, using a natural, local resource diet; also silvo-pastoral systems for cattle, along with diversification of crops and species, and greater integration of trees, perennials and livestock with other farming activities.

#### ECOLOGICAL SOIL MANAGEMENT

The National Service for the Use and Management of Agricultural Lands carries out soil studies ranging from detailed mapping to research on the needs and nutritional requirements of crops. The Soil Research Institute and other research centers have developed effective methods for the management, conservation, and recovery of compacted, salinized, eroded, and other degraded soils. Today, we have a sufficient body of knowledge regarding soil conservation and recovery. Organic techniques, such as the use of living barriers, ground cover of locally adapted pasture species, contour plowing, etc., are some of the measures used to check degradation and aid regeneration, though there is still much to be done. In contemporary Cuba, we also have a conservation tillage system developed completely within the

country, based on scientific research and the accumulated knowledge and wisdom of the Cuban *campesino* tradition.

#### URBAN AGRICULTURE

In the early 1990s, a strong urban agriculture was born, with many city dwellers organically growing a variety of basic foods for their families, their workplace cafeterias, and the market. The effectiveness of organic techniques in urban gardening has been clearly demonstrated, and it is here that we are possibly closer to the ideal of integrated agro-ecological systems, due in part to the total prohibition on the use of chemicals because of the proximity to dense human populations.

#### POPULARIZATION OF SMALL-SCALE RICE CULTIVATION

Widespread small-scale growing of rice—a staple food in the Cuban diet—appeared spontaneously as a consequence of the economic crisis. Today, there is a popular rice cultivation program, in which this cereal is grown in small plots for family consumption and sale of surplus—an important source of income for many families. This type of small-scale cultivation has been a key factor in the stable presence, at acceptable prices, of rice in farmers' markets.

#### MEDICINAL PLANTS

In 1992, organized production of medicinal plants began in Cuba, although there was a pre-existing popular tradition regarding their cultivation and use. Today, there is a growing trend of rediscovery and use of 'green medicine' for the prevention or cure of various diseases. Correspondingly, the locally generated supply of many medicinal plants is also on a steady rise.

#### ORGANIC OR ECOLOGICAL SUGAR

A significant quantity of sugar cane is now grown by organic,

sustainable methods on a commercial scale. (The industrial, chemical-intensive approach of mono-cropping sugar round the year, and year after year, has been abandoned.) According to current plans, there will be at least one mill producing organic sugar in each province in the coming years. The ecological practices that are followed include: intercropping or rotation with edible legumes, biological pest control and the use of bio-fertilizers, compost, etc.

#### ORGANIC FRUIT

During the nineties, many new fruit orchards, covering about 32,000 hectares, were developed in Cuba, without the use of agrochemicals. Today, a variety of tropical fruit is being successfully grown following sustainable practices. Some of this is for direct consumption at tourism enterprises. At least five such organic orchard projects are supported by the United Nations Food and Agriculture Organization (FAO) and various NGOs. Simultaneously, inroads are being made in the organic export market for coconut.

#### ORGANIC COFFEE AND COCOA

There is growing demand in the international market for organic coffee and cocoa. Several thousand hectares of coffee plantations in the western mountains of Guantanamo and Santiago de Cuba are now organic, or under conversion to organic, for export to Europe. Similarly, several thousand hectares in the province of Guantanamo are also geared to organic production of cocoa for export.

#### PUBLICATIONS, EDUCATION, TRAINING AND RESEARCH

The rapid movement towards sustainable agriculture has been possible because of determined efforts in education, training, research and popularisation through publications, radio and television. Cuban universities have been at the vanguard in



developing courses and activities to teach and update farmers, students and graduates in agro-ecological methods in place of high-input technologies. The Center for the Study of Sustainable Agriculture at the Agrarian University of Havana offers a comprehensive program, including short courses and practical training, apart from a correspondence diploma in agro-ecology and sustainable agriculture, a master's degree, and a doctorate in agro-ecology.

Thousands of *campesinos* have excelled as students of agro-ecology at the Niceto Prez National Training Center of ANAP, in turn benefiting their respective cooperatives and organizations. To these thousands trained in formal courses, we can add hundreds of thousands of farmers trained by the MINAG, MINAZ, and ANAP through the use of participatory techniques and informal methods. ANAP's participatory farmer-to-farmer methodology has been very effective. Other outstanding results have been obtained in urban agriculture, and in joint activities of ANAP with the support of the Department of Project Coordination and Assistance of the Council of Churches of Cuba.

In recent years, journals, books, pamphlets, fliers, press notes, radio and TV shows, and other activities have supported Cuba's new approach to agriculture. Some of these efforts include the publication of the *Agricultura Organica* magazine; the *Se Puede* newsletter of the Man and Nature Foundation's Permaculture Group; the television show *De Sol a Sol* from MINAG and the Cuban Institute of Radio and Television; and a number of radio shows that have broadcast the agro-ecological message to the people. Over many years, the television show *Hoy Mismo* carried out excellent educational work in this field.

The collaboration and international aid received from different organizations in these initial stages of agro-ecological education, research, and publication includes support from: the FAO; UNDP; the International Federation of Organic Agriculture Movements; the Latin American Consortium for Agro-ecology and Development; Food First; AIAB; Bread for the World (Germany); the Latin American Agro-ecological

Movement; Oxfam; Humanist Institute for Development Cooperation; International Center for Rural and Agricultural Studies; Organization for Costa Rican Development; and others. In exchange, Cuban farmers, researchers and professors have shared their knowledge and experience in different countries, especially in Latin America, though also in other regions of the world.

## THE PRESENT AND FUTURE CHALLENGE

Organic farming and agro-ecology do not just represent a change of technological models, but of the very way in which we conceive of agriculture. This process inherently involves a change in social consciousness in tune with local reality. It runs counter to the vicious globalization promoted by neo-liberalism, but supports a more *humane*, solidarious and socially just globalization favouring self-sufficiency, without dependency on transnational corporations.

Agro-ecology does not harm the environment; it reduces the role of middlemen and intermediaries; develops the consciousness of farmers; and applies knowledge rather than crude technological recipes. It is an ally of nature and considers the farmer as a cultural and not just productive unit.

The favourable conditions present in Cuba include:

- a strong demand for agricultural products
- many qualified personnel linked to agricultural activities
- a population experienced in community work
- administrative and social structures that support food self-sufficiency
- official mass media willing to support promotional campaigns for the peoples' benefit
- research results that are compatible with the new model
- the return of many people to the countryside in recent years
- organizations dedicated to the creation of an agro-ecological culture

An important ongoing challenge is to widen consciousness

concerning the consumption of organic foods, and their essential link with health and the environment, and how they help maintain our independence from transnational corporations.

While the first steps have been taken with the successful implementation of input substitution, the future challenge will be to develop more complex agro-ecological systems that integrally and coherently combine diverse crops and plants, animals, forest management, and other subsystems, based on organic and sustainable methods—for gaining full advantage of synergistic processes. In this regard, we have highly promising experimental results and the empirical experience of those farmers who have traditionally practised agro-ecology on their farms, where animals, crops, fruit, and timber trees are fully integrated, while bio-residues are recycled, and animal traction and wind energy are used.

Cuba also needs to develop ever more effective methodologies for extension; increase the number of publications; support improved training; and search for ways to increase foreign collaborations benefiting both local and global interests. Finally, we must further strengthen the commitment and dynamic of work among people who are conscious of the lasting importance of this paradigmatic shift in agriculture.

(Condensed and adapted from 'Sustainable Agriculture and Resistance: Transforming Food Production in Cuba,' 2002, Food First, Institute for Food and Development Policy, USA)

### APPENDIX 3

## Forms of Agricultural Organization in Cuba

LUCY MARTIN

Cuban agriculture can be broadly categorised into 3 main organizational forms—State, Collective and Individual—with their respective sub-categories as listed below:

### STATE FARMS

- New Type State Farms (GENT)
- Farms of the Revolutionary Armed Forces (FAR)
- Farms of the Young Workers' Army (EJT)
- Farms of the Ministry of the Interior (MININT)
- Self-provisioning farms (autoconsumos) at State workplaces and public institutions

### COLLECTIVE FARMS

- Farms of the Agricultural Production Cooperatives (CPA)—collectives on private property
- Basic Units of Cooperative Production (UBPC)—collectives in permanent usufruct on land belonging to the State

## INDIVIDUAL FARMS

- Individual farms on private property
- Individual farms in permanent usufruct

(Most individual farms of both categories are members of Credit and Service Cooperatives)

## STATE SECTOR

The area of State farms shrunk from over 75 percent of the arable land in 1992 to less than 33 percent by the end of 1996. This sector includes farms belonging to the Ministry of Interior (MININT), the Revolutionary Armed Forces (FAR), and the Young Workers' Army (EJT)—a subdivision of the FAR. The primary purpose of these State production units is to provision their respective organizations, though they also sell considerable quantities of surplus food through state-owned wholesalers. The EJT has its own commercial arrangements and is one of the most efficient producers within the state agricultural sector.

## NEW TYPE STATE FARMS (GENTs)

After the creation of the UBPC collective farms (that preceded the GENTs), it became evident that the transition from state farm worker to an independent or collective farmer was one that could be made easier if progressive transitions were made. Consequently, the GENTs were conceived. These farms are completely owned by the state, but worker cooperatives are built upon them, and over time, they take on more financial and management responsibilities.

The worker cooperatives at the GENTs enter into profit-sharing schemes with the respective State bodies to which they are related. As the cooperatives take on more responsibilities, their profit entitlement is progressively enhanced. Rather than being State employees, the worker cooperatives enter into a contract with the State and the profits are shared among the

workers according to their own internal agreements.

In the GENTs, both profit and risk are shared between the state farm and the worker cooperative, but minimum salaries are guaranteed, while ultimate responsibility for the farm and key management decisions are taken at the state enterprise level. There is a great deal of flexibility in these arrangements.

## THE NON-STATE SECTOR

In the non-state sector, there are two major forms of production—collective and individual. The largest is collective production. Here, the land is worked jointly by all cooperative members, and management decisions are made through participatory democratic processes.

In individual production, each farmer's plot is worked on a family farm model. Most of these individual farmers are also members of Credit and Service Cooperatives—to access loans and extension support from the State, to purchase inputs in bulk, and to sell their produce—though production itself is independently managed at the individual level.

Within this entire non-state sector, there are two types of land tenure, private ownership and usufruct, which cut across both collective and individual forms of production.

## AGRICULTURAL PRODUCTION COOPERATIVES (CPAs)

The CPAs are the traditional revolutionary form of cooperative production in Cuba, originally founded in 1977 by farmers who voluntarily chose to unite their private individual lands and resources for increased production, marketing, and economic efficiency. In 1997, there were 1,156 CPAs with a total of 62,155 members, who owned 9.4 percent of the agricultural lands.

The CPAs had shown a steady decline in membership from the mid-1980s to the early 1990s, when they began to rebound. The recovery came about as new members joined, with backgrounds in the most diverse array of occupations. They were drawn to collective farming by the advantages of rural

cooperative life with respect to income, access to affordable food and, to a lesser degree, housing.

As a result of this influx of new blood, the present membership of CPAs is now more heterogeneous in respect to social origin, professional characteristics, needs and interests. At the end of the 1980s, the average age of a cooperative member was 41 years, but it is likely that the large influx of new members in the 1990s has brought down the average age in recent years.

#### BASIC UNITS OF COOPERATIVE PRODUCTION (UBPCs)

With the creation of the UBPCs (Basic Units of Cooperative Production) at the end of 1993, a new type of cooperative was established, not by the voluntary socialization of private property, but rather through the breaking up of state property and infrastructure, and the decentralizing of management responsibilities.

The UBPCs cultivate state lands given free of charge to the cooperatives in permanent usufruct. The average acreage of these collectives is substantially less than the former state farms from which they were carved.

Apart from the land itself, the other means of production—such as buildings, machinery, animals, irrigation systems, and tools—were sold to the cooperatives at favorable prices with low-interest loans, and thus constitute the private property of the cooperative. The UBPCs maintain commercial relationships with the distribution chain of the original state enterprise from which they emerged. These collectives are now the predominant type of farm in Cuban agriculture. In 1997, there were 2,654 UBPCs with 272,407 members occupying 42 percent of the land, which continues to belong to the State.

#### INDIVIDUAL FARMERS

Individual small farmers who work their land based on a family farm model can be classified into three main categories. Most of those who have private ownership of their farms are members

of Credit and Service Cooperatives (CCS). Then there are the individual farmers who have received lands in usufruct from the state in recent years, many of whom too are CCS members. Finally, the balance are dispersed individual farmers of both kinds of land tenure, who are not CCS members. In 2002, these three categories of individual farmers collectively held 55 percent of the private farmland in Cuba—up from 42 percent in 1988.

#### CREDIT AND SERVICE COOPERATIVES (CCS)

In 1997, there were 2,709 Credit and Service Cooperatives, with a total membership of 159,223 individual farmers working 11.8 percent of Cuba's agricultural land. In this type of cooperative, individual farmers work their farms independently, but join together to receive credit and services from state agencies. They may also share certain machinery and equipment held in common to derive benefits of economies of scale.

Since 1998, there has been an accelerated growth in the numbers of new individual farmer members in the CCSs, even more so than in the CPAs. In essence, this is an economic phenomenon, as individual farmers have higher incomes than do members of production collectives. This may be because they have a greater sense of ownership, and are able to make faster decisions; or perhaps the management practices on smaller, private holdings allow more efficient use of limited resources.

#### INDIVIDUAL USUFRUCT FARMERS

Beginning in 1993, individual families were given up to 27 hectares of land in free and permanent usufruct to grow specialty crops such as coffee, tobacco, and cocoa. Such allotments became possible with the dismantling of the larger state farms. By 1996, the number of these so-called *usufructuarios* from diverse backgrounds had grown from zero to 43,015 farmers.

In addition, many individuals in urban areas were given small, quarter hectare plots of land to grow food for themselves and their neighbors. The 1996 sales data from the farmers' markets

reveals the dominance of individual producers, who together accounted for 70.7 % of the sales at such markets.

In general, one can infer that the decentralization of farming operations and the downscaling of landholding sizes has helped stimulate the will and creativity of the farm workers, while allowing more flexibility for adjustment to local needs and conditions.

A woman, who is president of a UBPC, told us: "... when I was the head of the (precursor) state farm, I did not think as I do now. Only when one is here, does one really know what things are really necessary, and you try to spend as little as possible so that the cooperative can be profitable." She went on to give an example, of when "... the state enterprise charged us for trucking in water twice a day and this cost us almost 30 pesos ... and I said to myself, this cannot go on any longer ... so I jumped on a tractor, hooked a water tank on a trailer attached to it, and now the whole operation doesn't cost us even two pesos!"

Another UBPC member relates: "No, we don't have a schedule. If I have to bathe the animals, I do it until I've finished. At the end of the day, we're the ones who have to do what has to be done. I can't say I am going to quit now because it's time to go home. Nor can I afford to think: Oh, I'll let that other guy do it."

(Abridged from 'Transforming the Cuban Countryside: Property, Markets & Technological Change,' Chapter 4, 'Sustainable Agriculture and Resistance: Transforming Food Production in Cuba,' Food First, Oakland, California)

## APPENDIX 4

### Cultivating Havana

#### Urban Agriculture and Food Security in the Years of Crisis

CATHERINE MURPHY

The importance of urban agriculture as a social movement has gained increasing recognition in recent years. But city farming is an ancient practice. It was only with the development of modern industrial agriculture that rural areas became the sole providers of food.

As cities began to specialize in producing industrial goods and services, food was increasingly imported from the countryside (*Smit, 1997*). With the urban sprawl expanding, many bordering fertile areas were paved over, and agriculture was marginalized—both geographically and in the modern consciousness (*Rees, 1997*).

From the 1970s, urban food gardening began to revive, and now an estimated 14 percent of the world's food is produced in urban areas. There are over 1,000 gardens in New York City, and at least 30,000 in Berlin. In Dar es Salaam, Tanzania, over 67 percent of families are reportedly engaged in agriculture, while in densely populated Hong Kong, 45 percent of local

vegetable needs are met through intensive cultivation on only six per cent of the land area (*Garnett, 1996*).

#### THE BENEFITS OF URBAN AGRICULTURE

Urban agriculture offers many benefits through:

- increasing community food security
- providing local jobs and empowering urban people
- greening and beautifying cities
- treating organic wastes and recycling soil nutrients
- localizing food production and bringing it closer to the market
- improving freshness and variety of produce (*Nugent, 1997*)

The return of farms and gardens to the cities cuts down on the cost of transporting food over long distances, thus lowering its final cost, while reducing transport related fuel consumption and pollution.

Local urban agriculture also helps restore the nutrient cycles associated with food production and consumption, and plays an important role in municipal waste management (*Nelson, 1996*). Instead of dumping wastes into landfills, much organic waste can be turned into compost and returned to nearby gardens and farms, yielding significant ecological and economic savings.

Urban agriculture enhances biological diversity by encouraging the cultivation of a greater variety of fruits, vegetables and other plants, including trees, medicinal herbs and flowers. Small-scale gardeners conserve many unique cultivars that might otherwise die out (*Garnett, 1996*). The increased diversity of vegetation in turn attracts many birds and animals that have disappeared from the concrete urban landscape.

Urban agriculture also significantly supports the city economy, providing new industries and opportunities for employment. These include farming, gardening, composting, supply of seeds, tools and other needed inputs; also marketing, distribution and food preservation.

Most importantly, urban farms and gardens enable increased local control over food production and distribution, while encouraging community participation, and supporting farmer-consumer cooperatives and barter systems (*Rees, 1997*).

#### URBANIZATION AND AGRICULTURE

The social and environmental benefits of urban agriculture (summarized above) are desperately needed by cities as the world faces an unprecedented pace of urbanization—the largest and fastest migration from rural areas in human history. Based on current trends, it is estimated that by 2025, eighty percent of the world's people will live in cities. (*UNDP, 1996*) In such a scenario, can there be an integrated strategy to combat the social and environmental problems created by this rapid urbanization? Is there a feasible path that provides a healthy living environment for current and future urban residents, while satisfying basic needs?

A pressing concern is how to sustainably provide the increasingly urban planet with enough to eat. In developing countries, urban populations are growing much faster than agricultural production, distribution, and marketing networks. (*UNDP, 1996*) At the same time, neo-liberal globalization processes are widening the gap between rich and poor at unprecedented rates, while pushing countries to focus on export agriculture at the expense of national food security. (*Lappe et al., 1998; Bello 1994*) To begin to solve these problems, more food must be produced in the urban centers where it is consumed.

Today, urban producers around the world have different primary reasons for growing food. In developed countries, home and community gardens are most common among middle-income people and are seen as an enjoyable hobby. The produce is valued more for its freshness (and organic quality) rather than as an essential source of nutrition.

Urban gardening in cities like New York and Los Angeles is also a tool for community empowerment, providing work to marginalized youth, especially in low income and high crime

neighborhoods. One Latino gardener in Los Angeles asserted, "our kids play safely, and we do not have to worry about gangs." (Quoted in Fisher, 1996b)

However, in developing countries, urban gardening primarily addresses immediate food needs. Most gardeners are low income. They may also face crushing economic policies, civil war, drought, and extreme poverty. In addition to increasing family food security, city farmers work for increased incomes and greater economic security from the sale of foodstuffs. (Nugent, 1997)

The United Nations Development Program undertook a systematic investigation of urban agriculture worldwide, culminating in publication of the book, 'Urban Agriculture: Food, Jobs, and Sustainable Cities' (1996), and the founding of 'The Urban Agriculture Network' (TUAN). The book affirms that despite the growing importance of urban agriculture, it has survived with little or no official support. "Where governments are involved, it is most often to limit." (UNDP, 1996)

Urban farming tends to offend the 'modernist' ideal of a cosmopolitan center. In some cities, this prejudice has actually led municipal governments to fine city food gardeners or tear down their gardens. (UNDP, 1996).

Land access poses the largest constraint to city farming around the world. Few countries have any formalized urban agriculture programs or funding for urban food production. Until 1996, only Peru and Argentina—apart from Cuba—had urban agriculture departments (UNDP, 1996).

Though urban gardeners lack recognition and support, they have still made enormous strides in recent decades. One of the most important contributions of urban agriculture to developing nations is food security.

#### URBAN AGRICULTURE AND FOOD SECURITY

The notion of food security, as defined by the Community Food Security Network is that "all people should have access to a

nutritious diet from ecologically sound, local, non-emergency sources." (Fisher, 1996a) Distinct from a traditional focus on hunger prevention, food security includes long term self-sufficiency through a nutritionally adequate, culturally appropriate, and regular (dependable) food source. (Fisher, 1996a) Food security analysis conceptually unifies many programs and ideas that were traditionally treated as separate, such as: community gardens, farmers' markets, community supported agriculture, natural resource and environmental planning, and micro-enterprise development.

In a study of household gardening, Robin Marsh found that it offered the following food security benefits:

1. Production of fresh, diverse foods—seasonally or year-round.
2. Production of nutrient-rich foods otherwise not consumed, or consumed in smaller quantities.
3. Income earned from garden sales (and/or savings on purchased foods) increases cash available for buying staple foods for family needs.
4. Household gardens may become the dominant food source in times of crisis.
5. Local gardening provides an opportunity for hands-on nutritional education. It also enhances women's control over food production, increasing the likelihood that household nutrition will improve.

Marsh provides guidelines for designing family or community gardens to meet food security goals:

1. Build on traditional gardening practices and varieties.
2. Work in areas with adequate access to water and family labor.
3. Begin with community organizing and nutrition education.
4. Involve and train local people to be promoters.
5. Be flexible in the choice of species and cropping patterns; encourage diversity and cultivation of indigenous varieties.
6. Encourage self-reliance through use of local materials for soil and pest management, as well as household/community saving and exchange of seeds for propagation. (Marsh, 1997)

Attaining better food supplies and nutritional health through local self-provisioning requires resources, such as land and labor, tools, skills, and knowledge. Roads, transportation and accessible markets are necessary for trading surplus.

In 1980, nearly half of all foods consumed by people in the cities of the developing world were imported from other countries. In the Caribbean, food insecurity is rooted in centuries of colonial rule that prioritized the production of sugar and other cash crops for export, neglecting food crops for domestic consumption.

#### THE HAVANA EXPERIENCE

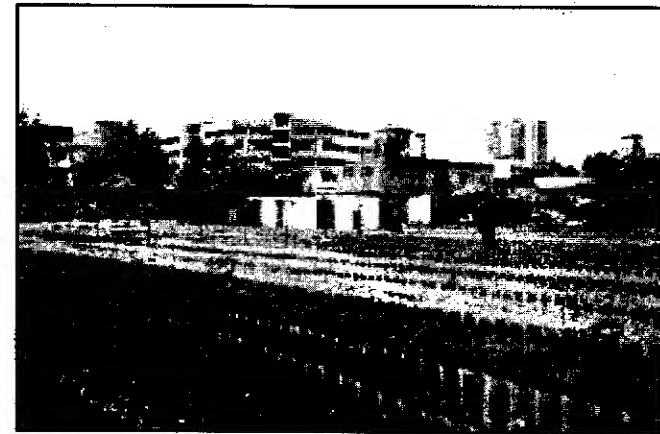
The Cuban city of Havana provides one of the best models to date of a comprehensive, highly successful, urban food production strategy. It includes land reform, technical assistance, organized supply of basic inputs, tools and knowledge, along with relevant research and training, demonstrating strong government support. There are many vital lessons to be learnt from the Havana experience.

In order to encourage the spontaneous, booming urban gardening movement in the early nineties, the Ministry of Agriculture made an unprecedented move and created in 1994 the world's first coordinated urban agriculture program. This integrated: 1) access to land; 2) extension services; 3) research and development; 4) new supply stores for small farmers and gardeners; and 5) organized points of sale for growers, and new marketing schemes—all with a focus on urban needs.

Urban agriculture has consequently become a major feature of the Havana cityscape. It owes its success to the enterprise and community spirit of its residents; the structural changes implemented through the Ministry of Agriculture in coordination with local and municipal bodies; the efforts of research centers and non-governmental organizations; and the determination of individual farmers. This model is now being replicated throughout the country in provincial capitals and other urban centers, and provides a model for countries around

the world attempting to prevent hunger within their cities.

The outlying districts of Havana have more open space than the downtown districts, which has allowed them even more gardens. Most of Havana's gardens are thus located in the eight peripheral municipalities of Boyeros, Cotorro, Arroyo Naranjo, Guanabacoa, Habana del Este, La Lisa, Marianao, and San Miguel de Padron that grow most of the food produced in the city of Havana.



A city farm in Havana  
Photograph : Eduardo Martino

Gardeners from these regions usually find good-sized vacant plots within walking distance of their homes. Often the garden is on an adjacent lot next to the gardener's house. (One gardener complained he had the longest walking distance of all the producers in his area—four blocks!) The majority of Havana's small farms, run by over 2,000 *campesinos*, are also found in the eight outlying municipalities.

The more heavily urbanized, centrally located municipalities of Havana City are Centro Habana and Habana Vieja, with few open spaces. While roofs and balconies do offer some open spaces here, their potential for gardening is limited by safety concerns, as many of the buildings are very old. The Cerro and



Diez de Octubre municipalities are the most densely populated, but have comparatively more open spaces and gardens, while the neighboring Regla and East Havana municipalities are both industrial and residential, with considerable open spaces, where food gardening is largely done for self-consumption.

The Plaza and Playa municipalities have a relatively large tourist sector, and house many office headquarters for joint ventures and the emerging private sector. Most residents in these neighborhoods have more access to services and income than other municipalities. The largest and most diverse farmers' markets are in these municipalities.

By 1998, there were over 8,000 officially recognized city farming units in Havana, apart from a much larger number of small gardens. With roughly 30 percent of Havana's available land presently under cultivation, these city farms and gardens are informally organized into five main categories:

1. Huertos Populares (popular gardens)
  2. Autoconsumos
  3. Organopónicos and Huertos Intensivos (intensive gardens)
  4. Campesinos Particulares
  5. Empresas Estateles (state enterprises)
- (Source: *Grupo Provincial Agropecuario*, 1998).

These five main urban agriculture categories are neither comprehensive nor mutually exclusive, but rather overlapping and complementary. This is particularly true for *organopónicos*, a term which actually refers to a specific agricultural strategy, not to an organizational category.

#### HUERTOS POPULARES (POPULAR GARDENS)

These are the most common and popular kitchen gardens, spontaneously started by city residents in yards, on balconies, patios, and rooftops. A variety of strategies are adopted, and consequently, such gardens assume many forms, including 'vertical gardens', planting seeds and seedlings in upright PVC pipes or cement tubing with holes (for drainage and aeration)

drilled in the sides. Many gardens are on nearby vacant lots, obtained by petitioning the local government. By the end of 1997, there were over 26,000 popular gardens covering 2,000 hectares of land in the city.

Almost all of the food harvested in these small kitchen gardens—mainly vegetables, condimentary herbs and fruit—is consumed directly by the families, close friends, and neighbors of the urban gardeners. (The Cuban notion of family includes aunts, uncles, cousins, grandparents, nieces, nephews, and in-laws; and often, close neighbors and friends as well!) Interviewing forty-two gardeners, researcher Angela Moskow found that an average of ten people regularly ate out of each kitchen garden. (Moskow, 1995)

While popular and community gardeners have unrestricted access to sell their surplus at local markets, most prefer to sell (fresh plucked) on site at their gardens, as it saves them the intensive work of a market harvest, the risk of unsold produce, and the time spent away from tending their plants. Further, no tax is payable on sales made directly from sites of cultivation, compared to the 5% charged in city markets.

Many of Havana's *Huerto* gardeners are retired pensioners in the fifties and sixties. The participation of women here is much greater than the role they traditionally played in rural agriculture (Moskow, 1995). (One of the largest gardens in Havana, an *organopónico* called *Las Marianas*, is organized by the Federation of Cuban Women and employs 140 women.) Large numbers of women now have full time jobs in urban gardens, while many others, usually older and retired, tend gardens in their spare time.

In general, small-scale kitchen gardening is well suited for retired people, as they can dedicate the time and close attention needed for good results. It is also a source of joy and self-esteem for elders and retired people, who may else feel that they are no longer needed.

Income through selling any surplus yield from gardens can help supplement a retired person's pension. A veteran Havana gardener, Santana, who first started his rooftop garden in Centro

Havana before the 'Special Period', originally planted a grapevine arbour to provide shade for his top storey home. He harvested so many grapes that he decided to make and sell wine, supporting his family with the income he earned. When the crisis hit, he expanded his terrace garden, bringing home old tires found on the side of the road. He cut the tires in half, filled them with soil, lay them out in four long rows on his roof, and planted vegetables, condiments, medicinal herbs, and flowers.



A rooftop tyre garden in Havana  
Photograph : Lisa R. Wolfe

#### AUTOCONSUMOS

The food grown in these self-provisioning gardens is usually for a specific school, factory, hospital, research station, or workplace. Most autoconsumos are located on-site or within close walking distance of the institution. By 1998, Havana had 376 autoconsumos with a total of 6,365 hectares of land (*Grupo Provincial Agropecuario*, 1998).

Each workplace independently decides how to structure responsibilities for garden work and food distribution. Some

prefer a regular group of employees tending their autoconsumo garden. This may be on a voluntary sign-up basis. Others divide the work between all employees. One Havana autoconsumo requires each employee to spend two hours every week in the garden, so that the work is equally shared.

Increasingly, new employees are hired to tend the garden full-time. Many centers have reassigned workers who had previously been responsible for other duties. A major benefit of having a stable, regular group working in the garden is that it allows for a closer relationship between the garden and those who work it. Such workers develop a more intimate knowledge of the soil and plants, and the specific care they need. Gardening techniques, as well as produce yield and quality improve with this increased knowledge and experience.

Any surplus food is sold, and every month, after calculating all expenses and salary deductions, half of the net earnings go to the workplace and half gets divided among the workers, who choose among themselves which three of them have worked the hardest that month. Those three get a higher percentage of the net earnings. Such high-end earners can take home double the average professional salary.

One autoconsumo in Boyeros Municipality sells a fair percentage of its produce to the public. The garden is located across the street from a bus stop where many commuters congregate each morning and evening. The garden workers take produce out to the bus stop in crates and sell directly to the commuters. This autoconsumo also supplies fresh produce to eight workplace lunchrooms and several hundred children daily in nearby schools. All of this comes out of 5,000 square meters (a little more than an acre) of garden space, from which they harvested 36,000 kilograms of organic produce between January 1 and October 31, 1997!

#### ORGANOPÓNICOS AND HUERTOS INTENSIVOS

The *organoponicos*, commonly planted in raised container beds or '*canteros*'—fully above the ground—use a soil mix that is mostly

compost or manure. They are perfect for vacant lots paved over with concrete, or where the soil is too hard to plough. The retaining walls of the raised bed are commonly of concrete blocks. Some are of stone, asbestos, wood, or metal scraps.

Apart from compost and manure, organopónicos sometimes apply *cachaza* (sugarcane filter-cake), a byproduct of the sugar refining process. Organizationally, they may be institutional autoconsumos, or workers' cooperatives, or privately run sites.

Twenty-one organopónicos have been deemed "high yield," producing an average of 16 kilograms per square meter (Companioni *et al.*, 1997). They are intensively planted with fresh vegetables that are in highest demand among Havana households. These vegetables, herbs and spices, are sold directly to the public through on-site vending stands.

Of the 451 organopónicos in Havana in 1998, less than half were state-owned, but managed through a variety of profit-sharing enterprises. Many of the organopónicos also serve as educational sites, displaying posters on the nutritional value and cooking methods of the different vegetables they sell, apart from the gardening techniques they follow.

Twelve organopónicos are organized as UBPC cooperatives. They pay a tax of 30 centavos per square meter of area under cultivation. One organopónico in Havana del Este was started by a young couple that used to teach in a school. They and their extended family now run a large garden at the Villa Panamericana, organized as a UBPC.

Every one in the Villa Panamericana family has specific responsibilities, including the elderly grandmother, who is in charge of providing lunch, snacks, and coffee for the cooperative members and hired workers. This UBPC regularly donates food to the school where the founding couple used to work, as well as to several other schools. They also host children from various schools in their area for educational garden workdays.

Where the soil is suitable, organopónico methodology is increasingly being displaced by direct intensive planting. These *huertos intensivos* use methods similar to the biodynamic approach promoted by John Jeavons, and the French intensive

gardening method of Alan Chadwick, which also follow a raised bed design (allowing good drainage and aeration), but one that does not have any retaining walls on the bottom or sides.

One huerto intensivo, run as an UBPC, is in the East Havana neighborhood of Alamar. The president of this cooperative, Miguel Salcines, a former administrator of a forestry research institute, insists that it is due to the incredible biodiversity of their garden that they have few pest problems. "We are reaching biological equilibrium," he said, "The pest populations are now kept under control by the constant presence of predators in the ecosystem. I have little need for application of *any* control substance."

The success of the organopónicos and huertos intensivos spawned great enthusiasm. On December 10, 1997, at the opening of the seventh national gathering of organopónicos in Havana, the Minister of Agriculture, Alfredo Jordan, made a special appearance. He announced the following 11-point organopónico/huerto intensivo program to be implemented over the next three years:

1. Strengthen the growing of vegetables in intensively planted, raised-bed gardens rather than walled containers.
2. Dedicate by 2002, ten sq.meters per city inhabitant for intensive gardening—3 sq.meters by 1998, 6 sq.meters by 1999, 8 sq.meters by 2000, and finally, 10 sq.meters per inhabitant by the end of 2002.
3. Appoint one person in each municipality in charge of assisting organopónicos.
4. Include more fruits and flowers in planting schemes.
5. Continue turning over land in usufruct to individual *fincas* (farms) and UBPCs; improve the organization and support of the plots and the growers.
6. Increase crop diversity with species and varieties suited to each site.
7. Build direct relationships with all municipal organizations.
8. Address irrigation problems and provide needed equipment.
9. Improve soil fertility with compost and bio-fertilizers.

10. Expand biological plant protection, addressing individual needs of each site.
11. Expand the seed houses into '*Casas de Atención Intensivo*,' (Houses for Intensive Outreach), where growers can acquire locally sourced seeds, tools, equipment, and technical assistance/extension advice.

### CAMPESINOS PARTICULARES

Havana has a significant urban farm sector, with 3,485 hectares of arable land within city limits (*Grupo Agropecuario*, 1997). The majority of these farms are in the greenbelt surrounding the metropolitan center of Havana, but close enough to easily supply produce. Much of this farmland is held in usufruct, and the typical farm size is approximately one *caballería*, or 13.4 hectares of land.

Many small farmers sell their produce directly from their farms. To encourage this, (and thereby reduce transportation needs), the government does not tax any produce that is sold on-site. This allows farmers to sell at lower prices, making food more affordable to nearby consumers.

A former MINAG employee, who worked as a tractor driver, now runs one of the small farms in the municipality of Boyeros. The Urban Agriculture Department helped him get use rights to an adjacent plot that had been fallow. Now he farms this property, growing vegetables, fruit, and *viandas*, the root and tuber crops that are a main staple of the Cuban diet. [The three most common *viandas* in Cuba are *yuca* (cassava, or tapioca), *boniato* (a white sweet potato), and *malanga*, a Caribbean taro.] These crops are sold on-site from a small kiosk on the road in front of his farm.

This farmer has also been working closely with Havana's urban reforestation program, *Mi Programa Verde* (My Green Program). He has planted guava and avocado trees in wide rows, with space between them for his regular annual crops. Not only will the trees provide him extra income and produce, but also give shade for a number of vegetable varieties that

cannot survive in the tropical sun during summer, thereby extending the growing season. (Farmers are learning from each other that it is best to plant time-tested crop varieties suited to the local conditions, season and micro-climate.)

### STATE ENTERPRISES

There are three state-run agricultural enterprises in Havana: the *Empresa de Cultivos Varios* (Mixed Crop Enterprise), the *Empresa Hortícola Metropolitana* (Metropolitan Vegetable Enterprise) and the *Empresa Pecuaria* (Animal Husbandry Enterprise). All three existed before the Special Period, but have gone through major transitions to improve their organization and services in response to the crisis. This has been possible by decentralizing and privatizing food production (while breaking up and fundamentally reorganizing the old, large bureaucratic state farms.)

For many years, the *Empresa de Cultivos Varios* was a centrally organized state enterprise that bought, sold, and distributed fruits and vegetables for national consumption and export. It also produced some fruit, mostly in large mango orchards on the outskirts of Havana. These orchards had low yields before they were reorganized. In 1994, the *Empresa* began a transformation to what are now called the *Empresas de Nuevo Tipo* (New Type of Enterprises)—that offer individual and collective incentives to stimulate greater productive efficiency.

The former, centralized *Empresa* was decentralized into 21 farms, which continue to produce for the State Enterprise and its distribution chain, but each is run as an individual business with its own management. The farms are further broken down into small-scale units given to individual workers, who take on a more active role in the management of their unit. In addition to their monthly salary, they share the profits of the farm. Each farm decides its own structure, goals and division of responsibilities.

For example, one of the *Cultivos Varios* farms 'of a New Type' was established by giving away land. Participating families were required to care for the existing mango trees that would still

belong to *Cultivos Varios*. In return, each family could build a house on the site, raise a limited number of livestock, and grow any additional crops they wished for their own consumption and for sale.

Before this transformation began in 1994, *Cultivos Varios* was producing 73,000 *quintales*, or 3,650 tons of produce annually, resulting in a net loss of 10 million pesos per year. By the end of 1997—three years into the new system—sales had reached 203,000 *quintales* and generated significant net earnings. This included 36.3 tons of medicinal plant material sold to the Ministry of Public Health, but did not include what was consumed on site.

The Empresa Hortícola Metropolitana (or Metropolitan Vegetable Enterprise) manages the 21 'high yield organopónicos' in Havana City, and also coordinates sale and distribution of the produce from 2,200 small farmers. It negotiates directly with each small farmer on the quantity and price of the products s/he agrees to sell. Much of the produce that this *Empresa* buys is sold at the high yield organopónico vending stands.

The third state enterprise, Empresa Pecuaria, has 11,913 hectares within the city of Havana, organized into various smaller, semi-private enterprises. (*Grupo Provincial Agropecuario*, 1997) In addition to raising crops and breeding cattle, this *Empresa* oversees the rearing of small animals: chickens, rabbits, goats, sheep, and pigs. Decentralization, profit sharing and other strategies aimed at improving efficiency have significantly boosted its total production.

#### BIO-DIVERSE AND WHOLESOME FOOD

One of the main goals of urban agriculture is to provide a daily per capita production of 300 grams of fresh vegetables for all urban inhabitants, based on FAO recommendations for human consumption. In 1997, the popular gardens, autoconsumos, organopónicos, and small farms together produced over two million *quintales*, or 160,000 tons of food, mainly vegetables and

fruit. Each sector of urban agriculture made significant contributions to this total. The sector-wise production in *quintales* (100 lbs.) was as follows:

<i>Huertos Populares</i>	358,000
<i>Organopónicos</i>	295,000
<i>Autoconsumos</i>	601,000
<i>Campeños</i>	561,000
<i>Empresa de Cultivos Varios</i>	203,000
TOTAL	<u>2,018,000</u> quintales

[Source: *Grupo Provincial Agropecuario*, 1998]

Since home and workplace gardens are primarily for self-provisioning, gardeners plant what they most want to eat: fresh vegetables, roots and tubers, culinary herbs, and some fruit. They may also raise a few small animals for meat and eggs. Lunch is the main meal in Cuba, and is especially important since there is little tradition of eating breakfast. Workplaces, and therefore autoconsumos, are responsible for providing workers with a hearty, filling meal at midday.

Organopónicos, on the other hand, see their job as providing the complementary foods that neighborhood residents do not easily get, and which are best consumed fresh. Their produce includes lettuce, green onions, New Zealand spinach, chard, tomatoes, green beans, and a few other vegetables and condiments.

The present rich diversity of Havana's food crops provides key carbohydrates, proteins, vitamins, and minerals. Popular gardens have countered the historic lack of variety of foods available. They have brought back many traditional crops that for years were difficult to find, such as passion fruit, sesame, and custard apples. Gardens have also helped introduce new crops and varieties not previously eaten in Cuba, such as spinach.

The main food crops grown in Havana in 1996 were:

## VEGETABLES

Beets	<i>Remolacha Beta vulgaris</i>
Cabbage	<i>Col Brassica oleracea</i>
Carrots	<i>zanahoria Daucus carota</i>
Celery	<i>col Apium graveolens</i>
Chard	<i>acelga Beta vulgaris</i>
Chives	<i>cebollina Allium ascalonicum</i>
Corn	<i>maíz Zea mays L.</i>
Cucumber	<i>pepino Cucumis sativus</i>
Eggplant	<i>berenjena Solanum melongena</i>
Garlic	<i>ajo Allium sativum L.</i>
Green Beans	<i>habichuela Phaseolus vulgaris</i>
Lettuce	<i>lechuga Lactuca sativa</i>
Okra	<i>Quingombó Hibiscus esculentus</i>
Onion	<i>Cebolla Allium cepa</i>
Peanut	<i>Mani Arachis hypogaea</i>
Pepper	<i>Ají Capsicum frutescens</i>
Radishes	<i>Rábano Raphanus sativus</i>
Spinach	<i>Espinaca Spinacia oleracea</i>
Squash	<i>Calabaza Cucurbita maxima</i>

## FRUIT CROPS

Avocado	<i>Aguacate Persea americana</i>
Banana (fruit)	<i>Plátano fruta Musa paradisiaca</i>
Banana (frying)	<i>Plátano macho (vianda) Musa balbisiana</i>
Chirimoya	<i>Annona chirimola</i>
Coconut	<i>Coco Coco nucifera</i>
Grapefruit	<i>Toronja Citrus paradisi</i>
Grapes	<i>Uvas Vitis spp.</i>
Guava	<i>Guayaba Psidium guajava</i>
Sour Oranges	<i>Naranja agria Citrus aurantium</i>
Soursop (or sweetsop)	<i>Anón Annona squamosa</i>
Lime	<i>Limón Citrus aurantifolia</i>
Mandarin Orange	<i>Mandarina Citrus nobilis</i>

Mango	<i>Mango Mangifera indica</i>
Mamey	<i>Mamey Calocarpum sapota</i>
Melon	<i>Melón Citrullus vulgaris</i>
Orange	<i>Naranja Citrus aurantium</i>
Papaya	<i>Fruta bomba Carica papaya</i>
Pineapple	<i>Pina Ananas comosus</i>
Passion Fruit	<i>Maracuya Passiflora spp.</i>
Tamarind	<i>Tamarindo Tamarindus indica</i>
Tomatoes	<i>Tomate Lycopersicon esculentum</i>

## VIANDAS

Cassava	<i>Yuca Manihot esculenta</i>
Plantain (frying)	<i>Plátano (macho) Musa balbisiana</i>
Potato	<i>Papa Solanum tuberosum</i>
Sweet Potato	<i>Boniato Ipomoea batatas</i>
Taro	<i>Malanga Alocasa spp.</i>

## LEGUMES

Pigeon pea	<i>Gandul Cajanus cajan</i>
Black beans	<i>Frijol negro Phaseolus spp.</i>
Red beans	<i>Frijol colorado Phaseolus spp.</i>
Soy beans	<i>Soya Glycine max</i>
Garbanzos	<i>Garbanzos</i>

## OTHER

Rice	<i>Arroz Oryza sativa</i>
Sugar Cane	<i>Caña de azúcar Saccharum officinarum</i>

[Sources: Moskow, 1995 & Chaplowe, 1996]

## HORTICULTURAL CLUBS

All around the world, garden success improves with social organization and collaboration. (UNDP, 1996) In Cuba, this has greatly benefited urban gardeners, many of whom are organized

into *de Horticultores* (or Horticultural Clubs), which are voluntary and often informal organizations of gardeners working in the same neighborhood. Most of these clubs have between ten and 20 members. By December of 1997, 18,628 people had organized 926 clubs in Havana, a figure that is steadily growing.

These urban food gardeners' clubs help organize information sharing among gardeners in the city, and also distribute seeds, tools, and other garden inputs. Extension workers from the Urban Agriculture Division hold educational workshops with the local *Grupos*, and share printed informational materials and other resources with them.

Extension workers prioritize efforts targeting the clubs, since they are able to reach many more gardeners at one time. A great deal of organic gardening information has been passed on to the urban farmers of Havana through such clubs, helping to strengthen and fulfill the city's commitment to organic cultivation.

While participation in the clubs is voluntary, the benefits are a strong incentive. These are primarily: access to educational workshops, demonstrations; networking with other gardeners; some material resources provided by the Ministry of Agriculture; and easier access to markets. Social incentives include companionship, camaraderie, and the collective celebrations. Groups also come together occasionally to help with particularly difficult jobs on members' individual plots.

After Havana's city government passed a law (in the latter nineties), prohibiting the use of chemical pesticides in agriculture within city limits, it proactively worked to promote ecological alternatives through the urban gardeners' clubs. The integrated approach emphasizes prevention, and the use of organic, locally produced control agents when necessary. (Rosset & Moore, 1997) Many gardeners have learned how to make homemade botanical insecticides from locally available plants.

## PLANT BASED PEST CONTROL

Plant Name	Useful Plant Part	Preparation Method	Use Against
Garlic;	Cloves and seeds;	Crush in water;	Larvae
Yellow Mamey;	Seeds;	Dry, grind, dissolve in water;	All kinds of insects
Calendula;	Flowers;	Steep in water for 24 hrs;	Larvae and insects
Onion;	Bulbs and leaves;	Crush in water;	Molds, fungus
Neem;	Fruit, leaves, seeds;	Dry, grind, dissolve in water;	All kinds of insects

[Source: *Consejo de Iglesias de Cuba*, 1997b]

## AGRICULTURAL EXTENSION SERVICES

The city's network of extension agents is one of the most important services established by Havana's Urban Agriculture Department to support local food gardeners in all possible ways. Extensionists are organizers, teachers, and referral experts, who assist people in sourcing needed information and other resources in the city. They also connect gardeners to one another, inform them about upcoming workshops, and help them acquire any necessary inputs.

When Havana's extension network was initially designed, one extensionist was assigned to each of its 15 municipalities. But in a few years, there were 67 such extension workers, who have intimate knowledge of the gardens in their municipality, including the unique needs of their assigned district, and who closely monitor local successes and difficulties. This helps build ongoing personal and working relationships between local government, extension agents, and gardeners, facilitating their effective collaboration.

There are many examples of what can happen when such relationships are formed. The first extension worker assigned to the neighborhood of Santa Fe, on the western outskirts of the Playa municipality, was Luis Sanchez, a longtime resident of this community. Thanks in part to his commitment and communication skills, Santa Fe came to have one of the highest concentrations of food gardens in Havana. The cultivators here had already gained extensive gardening knowledge at a time when those in other neighborhoods were just learning how to farm. Santa Fe gardeners employed many organic techniques, including compost making, companion planting, trees for shade cover, and integration of permaculture (sustainable design) principles (Murphy, 1995).

To promote agro-ecological techniques and resource sharing, the urban extension agents work closely with Havana's seed houses and the state agricultural research centers. These different services cooperate effectively and complement each other's work. Educational workshops offered to both extension workers and city gardeners exemplify the coordination among these agencies. By 1998, over 30,000 people had gone through training sessions and seminars organized by extension services and research institutes in Havana.

## SEED HOUSES

Among the best examples of public-private partnerships in agriculture are the Havana seed houses. By 1998, there were twelve seed houses in various municipalities, selling garden inputs, including seeds and tools, locally generated botanical/biological control products, bio-fertilizers, packaged compost, worm humus, etc.

When the seed houses first opened, they were run by the employees of MINAG (Ministry of Agriculture). But as part of the move to decentralize and encourage self-management and self-financing, the employees were made independent managers of the stores where they worked. Each seed house is now run

autonomously by one of these self-employed managers, who decides the prices of the products on sale, as well as his/her own salary, based on net profits.

Upon becoming independent, many seed house managers complained that it was impossible for them to stay properly stocked without frequently shutting down their store to procure inventory items. Managers needed to be on-site, they affirmed, to keep the shop open during regular hours. In the time-consuming task of replenishing inventory, shops were closing too often to keep regular clients and remain economically viable.

MINAG responded to this problem by purchasing a delivery truck in 1996—to collect and deliver inventory items to each of the seed houses. The person responsible for such collection and delivery, has no fixed or guaranteed salary, but is paid by each of the seed house managers. The Ministry issued initial guidelines on what each seed house should pay for the monthly delivery service, but this is not regulated and may fluctuate with the quality of service. If the delivery person does an inadequate job, the seed houses are not required to pay him. But, conversely, if they want good service, they must make it worth his while.

The volume of business for the seed houses has increased greatly since the delivery service began, and one person is no longer sufficient to serve all the seed house needs. Several seed houses have additionally hired their own full-time person to organize and pick up inventory.

The most commonly stocked items are: seeds, plants (including ornamental, medicinal and fruit tree saplings), clay pots, machetes, garden hoes, sprinkler heads, books and pamphlets, bio-fertilizers (including compost and worm humus), and botanical/biological control products.

Havana's newest and largest seed house to date was opened in the Diez de Octubre municipality. Instead of calling it a seed store, it was named the *Tienda de Atención a la Agricultura Urbana y Sostenible*, or 'Attention Center for Urban and Sustainable Agriculture'. While it stocks the standard inventory of seeds,



garden clippers, plants, etc., it has a longer-term vision. Mr. Percz, its manager, plans to turn his seed house into an urban agriculture training and education center, complete with a reference library and conference room. He also plans to "adopt" three autoconsumos at nearby day care centers, providing them with seeds, tools, and extension services. All three are in one of the poorest neighborhoods in Havana. MINAG wants more seed houses to go in this direction.

#### AGRICULTURAL RESEARCH CENTERS

Cuba has an extensive agricultural research sector, with most head laboratories and administration offices located inside Havana City limits. The Department of Urban Agriculture has been working with all of them to serve the needs of city growers. But increasingly, research stations now deal directly with urban gardeners and extensionists, providing resources and technical assistance. While before the Special Period, the research centers focused primarily on large scale, industrial agriculture concerns, they shifted their attention to lower input methods and alternative organic and ecological practices since 1989.

Of all the research institutions, INIFAT (National Institute for Basic Research in Tropical Agriculture) has been working most directly with urban gardens. Other institutes include the Plant Protection Research Institute (INISAV), the Pastures and Forages Research Institute (IIPF), and the Soil Research Institute. Yet other research organizations working with specific crops, such as the Rice Research Institute, have also joined the effort to increase urban production. Each research institute now has a National Plan and a Plan for the City (Havana), detailing specific tasks and responsibilities in urban agriculture.

The Pastures and Forages Research Institute has played a significant role through hosting organic agriculture workshops and trainings for urban growers. It hosted the first permaculture training course in Cuba, which was attended by many community gardeners and extension workers. It also supports

the cultivation and use of medicinal plants.

The Soils Institute has headed all work on soil management and fertility since the Special Period began. It has completely redirected research to explore non-chemical means of soil improvement, including work with compost, animal manure, green manure, and bio-fertilizers. It also supplies the seed houses, large autoconsumos and organopónicos with earthworm humus and worm-raising stock to enable gardeners to prepare their own vermicompost from locally generated biomass wastes and crop residues.

#### NON GOVERNMENTAL ORGANIZATIONS AND COLLABORATIVE PROJECTS

There are a number of Cuban and foreign non-governmental organizations (NGOs) in Cuba today. Most of the Cuban NGOs were formed after the Special Period began, with hopes of addressing various new issues brought about by the crisis. By 1995, there were over 200 such NGOs. Most Cuban NGOs focus on community development, and several of them have given special priority to supporting urban gardens and community food security efforts.

Among the more prominent NGOs are: the Cuban Organic Farming Association (ACAO), The Foundation for Nature and Man, the 'Group for Integral Development of Havana', Pro-Nature, Cuba-Solar, and the 'Community Food Preservation Association'.

#### MI PROGRAMA VERDE (MY GREEN PROGRAM)

This is one of the newer programs involved in reforesting the city, and enhancing food security. The use of 'My' in the name conveys the idea that each citizen should feel ownership of the program, and take personal responsibility for the reforestation of the city. The goal of *Mi Programa Verde* is to plant 17 million fruit and wood-bearing trees, of which over five million trees

had already been planted by 1997 through 5120 grassroots projects. (*Grupo Agropecuario*, 1997) All of the trees that *Mi Programa Verde* promotes have multi-use benefits such as bearing edible fruit, providing fuel for cooking, or wood for building.

The Ministry of Agriculture, Havana's city government and the city planning commission, have promoted this long-term concept to increase urban biodiversity and options for food production. Vegetable gardens produce much in the short run, they say, but Havana must increase permanent fruit yields if the city is to be truly sustainable.

There are now 86 nurseries in Havana that raise tree saplings for *Mi Programa Verde*. One of these is a small cooperative on the southern outskirts of Havana. It specializes in producing fruit saplings, ornamental plants, and some unusual food crops. Currently, it is propagating (among other species) cashew trees that are perfectly adapted to the Cuban climate, but which had almost become extinct here. The saplings and small trees are being sold at many locations, including all seed houses and most *organopónicos*.

## CONCLUSIONS

Havana's urban gardens have been central to mitigating the food crisis. Many analysts erroneously believed that with the easing of the food crisis, urban gardens in Havana would begin to fade away, but just the opposite has occurred. Havana's farms and gardens have slowly and steadily grown in size, number and quality, as urban gardeners learn and use increasingly effective gardening techniques. Some neighborhoods now produce much of their own food, and have increased the freshness, quality, and variety of the urban diet. Urban gardens are also helping to bring back traditional crops and uncommon varieties that had been absent from Havana for many years.

The key elements in Havana's success have been:

- political will
- real access to public lands

- co-ordination of, not competition for, local resources
- concrete programs to support small producers
- encouraging producers' sense of ownership
- establishing a strong extension program
- guaranteeing affordable inputs
- strong local demand for fresh produce

Although the urban gardens face limitations and challenges, the cultivators and agriculture professionals have identified the main areas that need to be improved and have developed comprehensive strategies to address them using organic and agro-ecological techniques.

The commitment to organic strategies is still on the rise. The results have spoken eloquently. These have convinced both producers and policy makers that urban organic farming is a viable way to increase community food security.

Other cities in the world have much to learn from the Cuban experience with urban agriculture. Havana has proven that a large city with a history of dependence on food imports can dramatically increase community food security and improve the quality and variety of available produce. All this can be achieved while enjoying the related environmental benefits of natural resource regeneration, community greening and beautification. With continued commitment to food security, access to public resources and community participation, these gardens will belong to Havana's cityscape for years to come.

(Abridged and adapted from 'Cultivating Havana', Development Report No.12, by Catherine Murphy, published by Food First, Institute for Food and Development Policy, USA.)

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## Acronyms

ACAO	<i>Asociación Cubana de Agricultura Orgánica</i> or Cuba's Organic Farming Association, (subsequently renamed GAO)
ANAP	<i>Asociación Nacional de Agricultores Pequeños</i> or the National Association of Small Farmers
CCS	<i>Cooperativa de Créditos y Servicios</i> or Credit and Service Cooperatives
CMEA or COMECON	Council of (for) Mutual Economic Assistance
COMARNA	<i>Comisión Nacional de Protección del Medio Ambiente y del Uso Racional de los Recursos Naturales</i> or National Commission for the Protection of the Environment and the Rational Use of Natural Resources
CPA	<i>Cooperativa de Producción Agropecuaria</i> or Agricultural Production Cooperatives
CREEs	<i>Centro de Producción de Entomófagos y Entomopatógenos</i> or Centres for the Production of Entomophages and Entomopathogens
EJT	<i>Ejército Juvenil de Trabajo</i> or 'Youth Work Troops'
FAO	Food and Agriculture Organization (of the United Nations)
GAO	<i>Grupo de Agricultura Organica</i> or the Organic Agriculture Group of Cuba

## Acronyms

MINAG or MINAGRI	<i>Ministerio de Agricultura</i> or Ministry of Agriculture
SRI	'System of Rice Intensification' or the Madagascar method of growing rice.
UBPC	<i>Unidad Básica de Producción Cooperativa/ Unidades Básicas de Producción Cooperativa</i> or Basic Unit(s) of Cooperative Production

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## THE GREAT AGRICULTURAL CHALLENGE

Veteran Natural Farmer, Bhaskar Save's  
Open Letters to M.S. Swaminathan,  
National Commission on Farmers

Transcribed by Bharat Mansata

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Addressing the mounting spate of farmers' suicides, its roots and remedies, Bhaskar Save writes: "I am an 84-year old farmer with over 6 decades of personal experience. . . . I say with conviction that **only by organic farming in harmony with Nature, can India sustainably provide abundant, wholesome food and meet every basic need of all—to live in health, dignity and peace.**

" . . . You are the 'father' of India's so-called 'Green Revolution' that flung open the floodgates of toxic 'agro' chemicals—ravaging the lands and lives of millions of Indian farmers over the past 40 years."

What follows is a devastating critique of the government's agricultural policy, and an eloquent plea for fundamental re-orientation. It reveals deep insights into the ground realities and wounded potential of Indian farming. A reader comments, "This is reminiscent of the native Chief Seattle's immortal letter to 'the Great White Chief' of the marauding soldiers."

Swaminathan wrote back to Save, "I have long admired your work and am grateful to you for the detailed suggestions . . . valuable comments and recommendations . . ."

Here is the whole, fascinating record of the letters and annexures, including one on Save's farm—a veritable 'food forest' and net supplier of water, energy and fertility to the eco-system of its region, rather than a net consumer!

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